

Endangered Species Act Section 7
Consultation
and
Magnuson-Stevens Act
Essential Fish Habitat Consultation

BIOLOGICAL OPINION

IMPACTS OF TREATY INDIAN AND NON-INDIAN FISHERIES
IN THE SNAKE RIVER BASIN IN YEAR 2002
ON SALMON LISTED UNDER THE
ENDANGERED SPECIES ACT

Agency: U.S. Fish and Wildlife Service
National Marine Fisheries Service
Bureau of Indian Affairs

Consultation Conducted By: National Marine Fisheries Service,
Northwest Region

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INTRODUCTION

The National Marine Fisheries Service (NMFS) is required under Section 7 of the Endangered Species Act (ESA) to conduct consultations, and to issue biological opinions on actions authorized by federal agencies in order to ensure that such actions are not likely to jeopardize the continued existence of any endangered or threatened species, or to result in the destruction or adverse modification of critical habitat of such species. This biological opinion considers the effects of fisheries proposed for the year 2002 in the Snake River basin by the State of Oregon and the Shoshone-Bannock Tribes (SBT), Confederated tribes of the Umatilla Indian Reservation (CTUIR), and Nez Perce Indian Tribe (NPT) (hereafter referred to as “Parties”). Listed species in the action area that are potentially affected include Snake River (SR) spring/summer chinook, SR fall chinook, and SR sockeye salmon, and Snake River basin steelhead.

CONSULTATION HISTORY

Fisheries in the Snake River basin were managed under the Columbia River Fish Management Plan (CRFMP) and two subsequent interim agreements of the parties to *U.S. v. Oregon* from 1988 through July of 1999 when the agreements expired. The CRFMP was a consent decree adopted by the federal court in the case of *U.S. v. Oregon*. NMFS has provided consultation under section 7 of the ESA on proposed fisheries in the Snake River basin since 1992 when SR sockeye, spring/summer chinook and fall chinook salmon were first listed under the ESA. While the CRFMP was in effect, the Technical Advisory Committee (TAC) of *U.S. v. Oregon* generally prepared biological assessments for proposed tribal and state fisheries which were submitted to NMFS by the U.S. Fish and Wildlife Service (USFWS). The TAC biological assessments considered treaty Indian and non-Indian fisheries within the jurisdiction of the CRFMP, with the exception of Idaho State fisheries in the Snake River basin which were considered separately under section 10 of the ESA. Since expiration of the CRFMP, the TAC has continued to submit biological assessments to NMFS for fisheries proposed by the Parties, for section 7 consultation.

The first consultation regarding Snake River basin fisheries occurred in 1992. The Shoshone-Bannock Tribes (SBT) submitted a biological assessment (BA) for their fisheries through the U.S. Bureau of Indian Affairs (BIA), Fort Hall Agency (BIA 1992). NMFS concluded that these fisheries were not likely to jeopardize the continued existence of Snake River sockeye salmon, spring/summer chinook, or fall chinook salmon. In 1993-1998, Snake River biological opinions were expanded to address all fisheries, except those of Idaho, conducted by the parties to *U.S. v. Oregon*. In 1993 and 1994, NMFS issued biological opinions determining that these fisheries were not likely to jeopardize the existence of listed Snake River spring/summer chinook, Snake River fall chinook, or Snake River sockeye salmon (NMFS 1993a; NMFS 1993b; NMFS 1993c; NMFS 1994a; NMFS 1994b). In 1995 and 1996, NMFS issued “jeopardy” biological opinions with reasonable and prudent alternatives describing modified fisheries in the Pahsimeroi River, East Fork Salmon River, Yankee Fork, and the mainstem Salmon River from Sawtooth Hatchery to the Pahsimeroi River (NMFS 1995a; NMFS 1996a). In 1997, NMFS issued a “jeopardy” biological opinion for Snake Basin fisheries with a reasonable and prudent alternative describing

a level of take of Snake River spring/summer chinook salmon in the South Fork Salmon River (SFSR) area consistent with the conservation needs of the listed fish (NMFS 1997). In 1998, the NMFS issued a “jeopardy” biological opinion (NMFS 1998a), with a reasonable and prudent alternative describing modified fisheries in the upper Salmon River mainstem and the Pahsimeroi River. In 1999, NMFS issued a “jeopardy” biological opinion (NMFS 1999), with a reasonable and prudent alternative describing modified fisheries in the upper Salmon River mainstem and the Pahsimeroi River. In 2000 and 2001, NMFS issued “jeopardy” biological opinions (NMFS 2000a NMFS 2001a), with reasonable and prudent alternatives describing modified fisheries in the SFSR.

For 2002, the Parties propose to conduct fisheries in the Snake River basin consisting of tribal ceremonial and subsistence (C&S) fisheries and non-Indian recreational fisheries directed at adult spring and summer chinook salmon. The TAC submitted a BA on behalf of the SBT, the CTUIR and Oregon Department of Fish and Wildlife (ODFW) on March 8, 2002 (LeFleur 2002a). Subsequent addendums were submitted on April 19, 2002 (LeFleur 2002b) and May 14, 2002 (LeFleur 2002c). The BIA submitted a BA on behalf of the NPT on April 16, 2002 (Calica 2002a). One subsequent addendum was submitted by the BIA on behalf of the NPT on June 5, 2002 (Calica 2002b). Both biological assessments and their addendums (hereafter referred to as the “BAs”) were submitted to NMFS for the purpose of a section 7 consultation under the ESA.

NMFS did a preliminary review of impacts for the proposed 2002 fisheries and provided initial comments to the parties in a letter dated May 16, 2002 (Robinson 2002a and 2002b). In that letter NMFS also raised concerns with respect to the incidental take of listed fish in the proposed fisheries in the SFSR. The South Fork fishery was thus the subject of further consultation.

Contrary to recent years’ proposals, when many of the proposed fisheries would have taken place on groups of fish composed of a majority of listed fish and constitute direct take fisheries, the only proposed fishery which would result in direct take in 2002 is the Tucannon River fishery proposed by the NPT, where the tribe proposes a ceremonial take of two listed spring chinook.

BIOLOGICAL OPINION

1.0 DESCRIPTION OF THE PROPOSED ACTION

1.1 Proposed Action

Parties to *U.S. v. Oregon* propose to conduct fisheries in the Snake River basin during the 2002 season. The action considered in this Biological Opinion includes 2002 fisheries in the Snake River basin proposed by the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Shoshone-Bannock Tribes, and the State of Oregon, under the continuing jurisdiction of the U.S. District Court for the District of Oregon in the case of *U.S. v. Oregon*, Civil No. 68-513 MA (LeFleur 2002a, 2002b, and 2002c; Calica 2002a and 2002b). The proposed fisheries will have impacts on ESA-listed fish, particularly Snake River spring/summer

chinook salmon. In addition to the states and tribes listed above, three federal agencies – NMFS, the USFWS, and the BIA – are parties to *U.S. v. Oregon*. Agreement of these agencies, as well as the other parties, will be necessary for the fisheries to proceed without further order of the court. Once the consultation process is complete, it is the expectation of the tribes and states that their proposed fisheries will be agreeable to the proposing state and tribal parties, and will be approved by the participating federal agencies (NMFS, USFWS, and the BIA).

Idaho recreational fisheries in the Snake River basin were considered previously pursuant to a section 10(a)(1)(B) permit application. Permit 1233 authorizes take associated with Idaho fisheries. With the exception of Oregon State's fishery in Lookingglass Creek, Oregon and Washington non-Indian recreational fisheries in the Snake River basin are being considered through separate ESA Section 4(d) processes. Although non-Indian fisheries are, for the most part, not subject to consultation in this biological opinion, impacts associated with these fisheries are considered, in addition to proposed fisheries, where necessary and appropriate.

1.2 Action Area

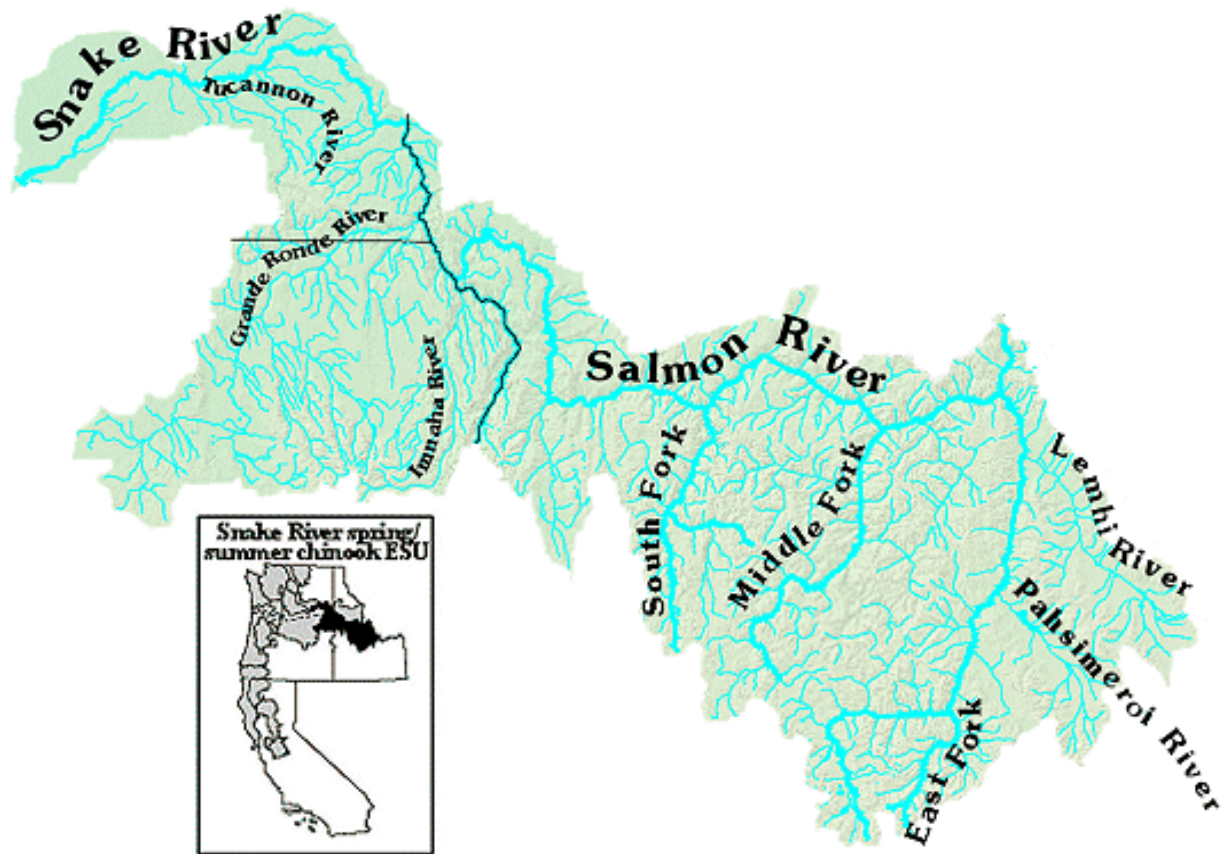
For purposes of this Biological Opinion, the action area encompasses the Snake River and its tributaries from its confluence with the Columbia River including the mainstem Snake River and Tucannon, Clearwater, Salmon, Grande Ronde, and Imnaha rivers (Figure 1).

1.3 Fisheries Proposed but not Considered

Table 1 summarizes the projected 2002 returns of spring/summer chinook salmon to hatchery and terminal areas in the Snake River basin, and the estimated proportions of those returns listed under the ESA. As a result of the anticipated run compositions to terminal areas, and the existing regulations addressing listed hatchery-origin fish, one of the fisheries proposed by the NPT would take place on a group of fish which is composed entirely of listed fish (Calica 2002a and 2002b). This would constitute a direct take fishery. In a May 7, 2002 letter to the BIA, NMFS indicated that fisheries directed at listed spring/summer chinook salmon in specified wild/natural production areas of the Tucannon River constitute a direct take fishery, which cannot be authorized through section 7 (Robinson 2002). The proposed direct take fishery is therefore not considered as part of this consultation.

With the promulgation of the tribal 4(d) rule (65 FR 42481; July 10, 2000), the tribes now have an alternative review mechanism for considering the merits of proposed tribal fisheries directed at threatened spring/summer chinook. The NPT submitted a Tribal Resource Management Plan (TRMP) for authorization of a direct take fishery in the Imnaha River targeting surplus listed hatchery spring chinook. However, this plan did not address the Tucannon River fishery.

Figure 1. Snake River spring/summer chinook ESU.



1.4 Description of Proposed Fisheries

For purposes of this Biological Opinion, the proposed Snake River basin fisheries have been grouped into five separate geographic units: 1) Mainstem Snake River from the mouth to Hells Canyon Dam; 2) Tucannon River Subbasin; 3) Clearwater River Subbasin; 4) Salmon River Subbasin, and 5) Grande Ronde River Subbasin. Fisheries on the Salmon River are further divided to include those on the Rapid and Little Salmon rivers, SFSR, and Upper Salmon River. The fisheries described below are summarized in Table 2. Only those fisheries considered in this opinion are described below.

Table 1. Projected 2002 returns of spring/summer chinook salmon to hatchery and terminal areas in the Snake River basin, and estimated proportions of those returns listed under the Endangered Species Act.

Subbasin/Fishery Area	Projected Hatchery-origin Return			Projected Naturally-produced Return			Total		
	Total ^a	Listed	% Listed	Total	Listed	% Listed	Listed	Unlisted	% listed
Snake River mainstem									
Oxbow Hatchery	797	0	0%	8	8	100%	8	797	1.0%
Salmon River Subbasin									
Little Salmon/Rapid River	9,710	0	0%	723	723	100%	723	9,710	6.9%
South Fork (mainstem) ^b	8,457	685	8%	837	837	100%	1,522	7,772	16.4%
Pahsimeroi Hatchery	382	382	100%	78	78	100%	460	0	100.0%
Sawtooth Hatchery	1,042	1,042	100%	1,143	1,143	100%	1,933	252	88.5%
Upper Salmon	0	0	100%	1,242	1,242	100%	1,242	0	100.0%
Total Hatchery-origin	19,591	2,109	11%	—	—	—	—	—	—
Natural-origin to other areas	—	—	—	4,852	4,852	100%	4,852	0	100.0%
Total Natural-origin	—	—	—	8,875	8,875	100%	—	—	—
Tucannon River	304	304	100%	297	297	100%	601	0	100.0%
Clearwater River Subbasin									
Red River & Crooked Rivers	2,767	0	0%	81	0	0%	0	2,848	0.0%
Powell Rack	2,512	0	0%	42	0	0%	0	2,554	0.0%
Dworshak Hatchery	1,820	0	0%	0	0	0%	0	1,820	0.0%
Kooskia Hatchery	3,615	0	0%	0	0	0%	0	3,615	0.0%
Total Hatchery	10,714	0	0%	—	—	—	—	—	—
Natural-origin in other areas	—	—	—	2,542	0	0%	0	2,542	0.0%
Grande Ronde River Subbasin									
Lookingglass Creek	160	0	0%	0	0	0%	0	160	0.0%
Naturally-produced (excl. Lookingglass Crk.)	1,353	1,353	100%	2,309	2,309	100%	3,662	0	100.0%
Imnaha River	3,631	3,631	100%	2,665	2,665	100%	6,296	0	100.0%
Hatchery-origin returns	36,550	7,397	20%						
Naturally-produced returns				16,819	14,146	84%			
Hatchery/natural Combined							21,299	32,070	40%

^a The percentage listed for each hatchery's return is developed from projections provided by the appropriate co-managers. This percentage is applied to the return projections developed by TAC (LeFleur 2002a, 2002b and 2002c).

Table 2. Fisheries proposed for 2002 in the Snake River Basin as described in the two BAs. Fisheries highlighted in bold would involve direct take of ESA listed species, which are not considered as part of this consultation.

Geographic Unit/Fishery	Dates of Fisheries	Managing Government 1/	Type of Fishery
Snake River Mainstem:			
Spring/Summer Chinook	May - June 2002	SBT	Non-Selective
Spring/Summer Chinook	May - June 2002	NPT	Selective
Tucannon River Subbasin:			
Tucannon Spring Chinook	May - July	NPT	Non-Selective
Clearwater River Subbasin:			
North Fork Clearwater Spring Chinook	Mid-April - July	NPT	Non-Selective
Clearwater River Basin Spring Chinook	May 20 - June30, 2002	SBT	Non-Selective
Clear Creek Spring Chinook	May - Mid-June	NPT	Non-Selective
Crooked River/Red River Spring Chinook	May - July	NPT	Non-Selective
Lochsa Spring Chinook	May - July	NPT	Non-Selective
Selway Spring Chinook	May - July	NPT	Non-Selective
Salmon River Subbasin:			
Little Salmon/Rapid River Spring Chinook	May - June	NPT	Selective
Little Salmon/Rapid River Spring Chinook	May - June	SBT	Non-Selective
South Fork Salmon River Spr/Sum Chinook	June/July - August	NPT	Selective
South Fork Salmon River Spr/Sum Chinook	June/July - August	SBT	Non-Selective
Grande Ronde River Subbasin:			
Lookingglass Spring Chinook	June - December	NPT/CTUIR/ ODFW	Non-Selective

1/ ODFW: Oregon Department of Fish and Wildlife; NPT: Nez Perce Tribe; CTUIR: Confederated Tribes of the Umatilla Indian Reservation; SBT: Shoshone-Bannock Tribes.

1.4.1 Unit 1: Mainstem Snake River to Hells Canyon Dam

1.4.1.1 Tribal C&S Fisheries

Nez Perce Tribe

In 2002, the Nez Perce Tribe proposes a ceremonial harvest up to 399 hatchery-origin spring/summer chinook, in the two delineated areas. The first area includes the Snake River from its confluence with the Imnaha River upstream to Hells Canyon Dam. The second area is from the mouth of the Clearwater River, down to the forebay of the Little Goose Dam.

The predicted return of spring/summer chinook past the area of the mainstem Snake River between the confluence of the Clearwater and Imnaha rivers is 797 unlisted Oxbow hatchery returns and 8 listed natural-origin returns. The predicted return of spring/summer chinook past the area of the mainstem SR, from the mouth of the Clearwater River down to the forebay of the Little Goose Dam, is predicted to be 53,370 adults. Of these, 36,522 (68%) are expected to be hatchery-origin returns, 16,818 (32%) natural-origin returns. Also, 7,147 (13%) are expected to be listed hatchery-origin returns, and 14,153 (27%) are expected to be listed natural-origin returns.

It is likely that most of the fishing effort will occur in the area of the mainstem Snake River between the confluence of the Clearwater and Imnaha rivers (Calica 2002b). However, some effort will also occur in the mainstem SR, from the mouth of the Clearwater River down to the forebay of the Little Goose Dam. The resulting impacts to listed fish from the implementation of the proposed fishery would be in between the two scenarios described below. The first scenario represents the minimum and the second scenario represents the maximum level of impacts associated with the proposed fishery.

If the tribal harvest occurs exclusively in the area of the mainstem Snake River between the confluence of the Imnaha River and Hells Canyon Dam, the proposed harvest of 399 hatchery-origin fish by the NPT (half of the predicted Oxbow Hatchery returns) would result in the handling of four listed natural-origin fish (half of the listed natural-origin returns to the area). Assuming a 10% catch and release mortality, the handling on 4 listed fish in this fishery would result in the mortality of 1 listed natural-origin spring/summer chinook.

If the tribal harvest occurs exclusively in the area of the mainstem SR, from the mouth of the Clearwater River down to the forebay of the Little Goose Dam, the proposed harvest of 399 hatchery-origin fish by the NPT would result in the harvest of 321 unlisted hatchery-origin spring/summer chinook, the take of 78 listed hatchery-origin spring/summer chinook. In the proposed fishing area, listed natural-origin fish comprise 27% of the run. Harvesting 399 hatchery fish would result in the handling of 107 listed natural-origin fish with a resulting mortality of 11 listed spring/summer chinook (Table 3).

Permitted non-lethal gear types include dipnet, hoopnet, paddle net, and hook and line. A 10%

handling mortality is associated with these allowable gear types utilized for this fishery. The Nez Perce propose to voluntarily restrict their fishing activities by releasing all wild/natural spring/summer chinook.

Table 3. Run Composition in the mainstem Snake River downstream from the Clearwater River, breakdown of hatchery harvest, and incidental handling mortality.

Run Component	Run size	% of total Run	% Listed of hatchery run	Harvest (% of run)	Handling (Mortality)
Hatchery	36,552	68%			
Hatchery Unlisted	29,405	55%		321 (1.1%)	
Hatchery Listed	7,147	13%	20%	78 (1.1%)	
Wild	16,818	32%			
Wild Unlisted	2,665	5%			
Wild Listed	14,153	27%			107 (11)
Total Run	53,370	100%			
Total Listed	21,300	40%			
Proposed Harvest (hatchery fish - listed and non-listed)				399	

Shoshone-Bannock Tribes

The Shoshone-Bannock Tribes propose to harvest spring/summer chinook salmon in the unoccupied land areas of the mainstem Snake River and its tributaries in the area between Hells Canyon Dam and the mouth of the Imnaha River; and below the mouth of the Clearwater to the mouth of the Snake River in 2002. Most of the effort is expected to occur between the Hells Canyon Dam and the mouth of the Imnaha River. The Tribes propose to harvest 20 spring/summer chinook of which one may be listed wild chinook as the 2002 harvest guideline for this area. Fisheries are expected to begin May 1, 2002 and will be closed when one listed chinook has been harvested. The Shoshone-Bannock Tribes will manage this fishery with tribal regulations.

1.4.1.2 Summary - Unit 1

The Nez Perce Tribe's proposal is to harvest up to 399 spring/summer chinook in the mainstem Snake River of with a predicted mortality of up to 89 listed wild/natural and/or hatchery fish. The Shoshone-Bannock Tribes propose to harvest 20 spring/summer chinook of which one may be wild chinook. No listed steelhead, sockeye or fall chinook salmon are expected to be harvested during the Tribal C&S fisheries for chinook.

1.4.2 Unit 3: Clearwater River Subbasin

1.4.2.1 Tribal C&S Fisheries

Shoshone-Bannock Fishery for Clearwater River Spring Chinook. The Shoshone-Bannock Tribes propose to maintain the opportunity to harvest spring chinook salmon in the unoccupied land areas of the Clearwater River system in 2002. The Tribes propose 2.5% percent of the estimated return of Clearwater River hatchery and wild spring chinook salmon as the 2002 harvest guideline. The Shoshone-Bannock Tribes propose to harvest no more than a total of 335 chinook (out of a projected total return of 13,389 as shown in Table 2) of which 64 would be wild (based on the percent wild expected in the Clearwater basin, see Table 2). None of the harvest would include listed fish. If fisheries occur, they would be expected to end around June 30, 2002.

Nez Perce Fishery for Clearwater River Wild/Natural Spring Chinook. The Nez Perce Tribe propose to take 636 (25% of the total return) of the predicted wild/natural spring chinook to the Clearwater River system (excluding Selway River-see below). The breakdown of expected harvest by return to specific tributaries will be determined as estimated wild/natural proportions are applied to each stock.

Nez Perce Fishery for North Fork Clearwater River Spring Chinook. The Nez Perce Tribe has conducted C&S fisheries in the North Fork Clearwater River annually since 1987 targeting Dworshak National Fish Hatchery (DNFH) spring chinook, except in 1991, 1994, and 1995 when the hatchery returns were poor. DNFH is located on the North Fork Clearwater River below Dworshak Dam. The Nez Perce spring chinook fishery usually opens in May and closes in mid-June or early July, prior to arrival of fall chinook, and takes place primarily below the hatchery ladder. Nez Perce tribal harvest is primarily by hook and line.

The projected return to Dworshak Hatchery in 2002 is 1,820 fish which is 620 fish more than the broodstock needs of 1,200. The Nez Perce Tribe has proposed a 2002 spring chinook fishery in the North Fork Clearwater River for a harvest of 310 hatchery chinook for tribal subsistence. The fishing area is on the mainstem Clearwater River from its confluence with the Snake River upstream to two miles above Clear Creek and on the North Fork Clearwater from its confluence with the mainstem upstream to the dam. Dates for the fishery will be set during April with anticipated opening from mid-April through July; closures will be regulated inseason. All traditional fishing gear is permitted.

Nez Perce Fishery for Clear Creek Spring Chinook. The Nez Perce Tribe conducted C&S fisheries in Clear Creek targeting Kooskia National Fish Hatchery (KNFH) spring chinook during 1987-2001. KNFH is located on Clear Creek, a tributary to the Middle Fork Clearwater River. The Nez Perce tribal spring chinook fishery usually opens in May and closes in mid-June or early July and takes place just below the hatchery ladder and downstream to the mouth of Clear Creek. Nez Perce tribal harvest methods for this fishery include dipnet, gaff, and hook and

line.

The projected return to Kooskia National Fish Hatchery in 2002 is 3,615 fish which is 3,015 more than the broodstock goal of 600. The Nez Perce Tribe proposes a 2002 spring chinook take in Clear Creek of 1,508 fish. Dates for the fishery will be set during April with anticipated opening from mid-April through July; closures will be regulated inseason. All traditional fishing gear is permitted.

Nez Perce Fishery for Crooked River/Red River Spring Chinook. The project return to Crooked River and Red River for 2002 is 2,767 adult hatchery fish, which is 1,857 fish more than the broodstock goal of 910 fish. There are predicted to be sufficient returns (Rapid River, Lookingglass at Lower Granite Dam, Dworshak and Powell) of suitable stock chinook to make up for the shortfall for egg take, thus the Nez Perce Tribe (NPT) is proposing a ceremonial fishery for 929 spring chinook from the Crooked River/Red River watersheds during 2002. Areas open would be on Crooked River from its mouth upstream, and on Red River from its mouth upstream. Dates for the fishery will be set during April with anticipated opening from May through July; closures will be regulated inseason. All traditional fishing gear is permitted.

Nez Perce Fishery for Lochsa Spring Chinook. The projected return for 2002 is 2,512 adult hatchery fish which is 1,762 fish more than the broodstock goal to meet Powell facility needs and Idaho Salmon Supplementation Studies needs (750 fish total). The Tribe has proposed to harvest 881 of the fish surplus to broodstock needs. Areas open would be the mainstem Lochsa River from its confluence with the Selway upstream to Three Forks (upstream of Powell). Dates for the fishery will be set during April with anticipated opening from May through July; closures will be regulated inseason. All traditional fishing gear is permitted.

Nez Perce Fishery for Selway River Spring Chinook. The Nez Perce Tribe proposes to harvest 100 (non-listed) wild spring/summer chinook in this section of the Clearwater River in 2002. The areas open will include the Selway River, from one mile below Selway Falls upstream to Meadow Creek. Dates for the fishery will be set during April with anticipated opening from May through July; closures will be regulated inseason. Seasons will be closed when the target harvest level is reached. All traditional fishing gear is permitted.

1.4.2.2 Summary - Unit 3

There is no anticipated take of listed fish in the proposed Clearwater River Subbasin from Treaty Indian fisheries. Clearwater River spring chinook are not listed under the ESA. Snake River sockeye and fall chinook salmon are generally not present at this time of year and do not enter or pass through the Clearwater Subbasin. No listed steelhead, sockeye or fall chinook salmon are expected to be harvested during the tribal C&S fisheries for chinook in this area.

1.4.3 Unit 4: Salmon River Subbasin

The proposed tribal fisheries considered in this opinion include those in Rapid and the South Fork Salmon rivers. These fisheries are described below.

1.4.3.1 Rapid River Tribal C&S Fisheries

Shoshone-Bannock Fishery for Rapid River Spring Chinook. The Shoshone-Bannock Tribes reserve the option to harvest spring/summer chinook in the Little Salmon and Rapid rivers. Fisheries in the Little Salmon and Rapid rivers normally occur during May until late June. The estimated return to Rapid River Hatchery is 9,710 hatchery fish, which is 6,730 fish more than the escapement goal of 2,980. During 2002, the Shoshone-Bannock Tribes propose to fish for spring chinook in the Little Salmon River, from the hatchery trap entrance downstream to the mouth of the Snake River. The Shoshone-Bannock Tribes propose to limit harvest to 2.5% of the expected hatchery return (243 hatchery and 10 wild spring/summer chinook out of the expected return of 9,710 hatchery and 399 wild fish) in this area in 2002. Fisheries are expected to begin early May and to be curtailed by the end of June if necessary or earlier when wild summer chinook arrive at the hatchery weir.

Nez Perce Fishery for Rapid River Spring Chinook. The Nez Perce tribal C&S fisheries targeting Rapid River Hatchery spring chinook have occurred in Rapid River since 1980. Rapid River Hatchery spring chinook return primarily from mid-May until late June. The Nez Perce Tribe's hatchery spring chinook fishery is open from mid-May to mid-June. Tribal harvest is by gaff, dipnet, spear, and hook and line.

The estimated return to Rapid River Hatchery is 9,710 fish, which is 7,310 fish more than the escapement goal of 2,400. The estimated listed chinook return to the Little Salmon River drainage in 2002 is 399 adults (399 spring/summer chinook) according to TAC estimates (LeFleur 2002a). The Nez Perce Tribe has proposed a 2002 spring chinook fishery in the Little Salmon and Rapid rivers for a harvest which would take 3,655 hatchery and 20 wild/natural chinook for tribal subsistence. This take would represent 37.64% of predicted hatchery and 5.01% of wild returns. The fishing area for the Little Salmon River is from the Salmon River Bridge upstream of the Salmon River confluence. The fishing boundaries for Rapid River are from the confluence upstream to 60 feet downstream of the trap entrance. Effort and catch are distributed in Rapid River from the trap entrance to the confluence with the Little Salmon. Dates for the fishery will be set during April with anticipated opening from May through July; closures will be regulated inseason. Initially, fishing will be open to all traditional gear including gaff, dipnet, hoopnet, spear, long bow and hook and line. If the take of wild fish reaches 16 (80% of the harvest ceiling) before the hatchery target take is reached, the fishery will be restricted to dipnet only to account for the additional incidental take of 4 wild spring/summer chinook. The remaining fishery will target hatchery fish with catch and release of wild fish.

1.4.3.2 South Fork Salmon River Tribal C&S Fisheries

Nez Perce Fishery for South Fork Salmon River Spring/Summer Chinook. The Nez Perce Tribe has proposed a 2002 spring/summer chinook subsistence fishery in the South Fork Salmon River to target half of the surplus of unlisted hatchery-origin fish returning to the weir. Based on preseason projection, the target harvest is 3,336 fish. The fishery as proposed would also be expected to result in 82 wild/natural and/or listed hatchery chinook mortalities based upon the projected return for listed and unlisted chinook to the weir and to the area from Goat Creek to the mouth of the East Fork South Fork. Areas open to fishing would include the South Fork Salmon River from 100 feet below the weir (RM 72) downstream to the confluence with the East Fork South Fork (RM 46). The fishery will occur during June through August. The season structure will be modified inseason by field regulations by the Nez Perce Tribe to address changes in run sizes and other circumstances. Fishing gear permitted will initially include all traditional gear (gaff, dipnet, hoopnet, longbow, spear, and hook and line).

The initial fishery would be non-selective utilizing all traditional gear types. Based on proportion of listed fish to unlisted fish, this fishery would result in the harvest of 76 listed fish while targeting 191 hatchery returns. This would be the trigger to restrict gear to dipnet only to target the remaining 3,696 hatchery origin fish. Thereafter, all wild and hatchery listed fish caught would be released. A handle rate of 1,134 listed fish is projected to occur while targeting the remaining allocated amount. Therefore, the dipnet fishery would have a catch-and-release mortality (1%) of an additional 11 listed chinook. Total impacts of the proposed Nez Perce Tribe fishery in the South Fork Salmon River would be 87 (5.7% of the run) listed fish.

Shoshone-Bannock Fishery - South Fork Salmon River. Based upon the 1997 South Fork Salmon River chinook harvest dispute and negotiations for Reasonable and Prudent Alternatives with NMFS, the Shoshone-Bannock Tribes modified their harvest framework (used since 1993) for special cases where hatchery and listed proportions of runs may be reasonably predicted. Two proposed harvest rates are set, one for each of the total and the listed components of the expected run. Fisheries may then be curtailed when either the total fish or listed fish harvest guidelines is reached.

Based on preseason expectations, the Shoshone-Bannock Tribes propose a harvest guideline on listed fish of 152 fish which is 10 percent of the projected 1,522 listed fish return. For the South Fork Salmon River fishery targeting hatchery fish below the weir, the Shoshone-Bannock Tribes propose a total harvest of 2,809 adult fish, of which no more than 152 would be listed.

The Shoshone-Bannock Tribes' fisheries would be curtailed once either the total fish or listed fish harvest guidelines in the South Fork Salmon River fishery areas are reached, or when salmon are observed spawning (until the spawning is completed), whichever of the three triggers occurs first. Because of the listed fish trigger, the worst-case would not cause more than 152 listed fish to be harvested within this fishery area, of which no more than 64 would be taken in the Poverty Flats.

The location of the Shoshone-Bannock tribal spring/summer chinook fishery in the South Fork Salmon River will be from the SFSR weir (RM 72) downstream to the confluence with the East Fork South Fork Salmon River (RM 46). Shoshone-Bannock tribal harvest monitoring has occurred annually and will continue for 2002. Because of diminished returns, recent fisheries in the South Fork Salmon River have been conducted from early July through mid-August. The Shoshone-Bannock Tribes expect the fishery to occur between mid-June and August 25, 2002. The curtailment date corresponds with the Shoshone-Bannock Tribes' intent that this fishery will target hatchery fish returning to hatchery release areas. Therefore, the fisheries would be conducted while chinook are still actively migrating to the hatchery release areas.

1.4.3.3 Summary - Unit 4

Based on preseason expectations, in the Little Salmon and Rapid rivers the Shoshone-Bannock Tribes are proposing to harvest 243 hatchery spring chinook and 10 wild chinook. In the South Fork Salmon River hatchery-influenced area, the Shoshone-Bannock Tribes propose to harvest 2,809 total spring/summer chinook including 152 listed spring/summer chinook. In the Rapid River, the Nez Perce Tribe proposes to harvest 3,655 hatchery and 20 wild chinook. In the South Fork Salmon River hatchery-influenced area, the Nez Perce Tribe proposes to harvest 3,386 unlisted hatchery and 82 listed spring/summer chinook. No listed steelhead, sockeye or fall chinook salmon are expected to be harvested during the tribal C&S fisheries for chinook in this area.

1.4.4 Unit 5: Grande Ronde River Subbasin

1.4.4.1 Non-Indian Recreational Fisheries

A sport fishery targeting Lookingglass Hatchery Rapid River stock spring chinook returning to Lookingglass Creek will take place in 2002. The Rapid River stock was originally transplanted into Lookingglass Creek from outside the basin and is therefore being phased out. All the returning Rapid River stock are therefore available for harvest. Sport fisheries occur in May and June. The fishery may be extended into July depending on fish abundance. The sport fishery will be artificial fly and lure only. Adipose-right vent marked fish may be taken. All other fish must be released unharmed.

Approximately 230 Lookingglass Hatchery Rapid River spring chinook are anticipated to escape to Lower Granite Dam this year. Approximately 70 percent are expected to return to Lookingglass Creek (160 fish). The remainder are expected to stray to natural production areas. Approximately 80 fish are expected to be harvested from Lookingglass Creek in the recreational fishery.

Although it is possible that listed fish from other parts of the Grande Ronde River could stray into Lookingglass Creek, there have been few observations of straying in the past. The expected

take of listed fish in the Lookingglass Creek fishery is zero. The recreational fishery allows the retention of marked fish. If an unmarked fish is caught in the fishery, regulations require its release.

1.4.4.2 Tribal C&S Fisheries

Since 1989, tribal fisheries have concentrated only on Lookingglass Creek because of very poor returns elsewhere in the Grande Ronde River Subbasin. The Lookingglass Hatchery spring chinook fishery takes place in Lookingglass Creek from the hatchery weir downstream 1.5 miles to the mouth. Fisheries for the Nez Perce and CTUIR have been conducted during weekends between mid-June and mid-July. Treaty Indian harvest is by gaff, dipnet, hoopnet, spear, and hook and line. No listed steelhead, sockeye or fall chinook salmon are expected to be harvested during the Tribal C&S fisheries for chinook.

Nez Perce Tribe and CTUIR Joint Fishery in Lookingglass Creek: The NPT and the CTUIR propose to take 80-100 spring chinook in Lookingglass Creek in 2002.

1.4.4.3 Summary - Unit 5

There is no anticipated take of listed fish in the proposed Lookingglass Creek fisheries. No listed steelhead, sockeye or fall chinook salmon are expected to be harvested during the tribal C&S fisheries for chinook in this area.

2.0 STATUS OF THE SPECIES AND CRITICAL HABITAT

Four salmonid Evolutionary Significant Units (ESUs) listed under the ESA are present in the action area. Snake River sockeye (*O. nerka*) are listed as endangered, Snake River spring/summer and fall chinook salmon and steelhead are listed as threatened. Of the four listed ESUs in the Snake River basin, only spring/summer chinook will be affected by the proposed fisheries. The substantive elements of the following discussion regarding species status therefore focuses on Snake River spring/summer chinook. A discussion about the status of Snake River fall chinook and steelhead can be found in the NMFS Biological Opinion on 2001 Fall Season Fisheries (NMFS 2001b). A discussion of the status of Snake River sockeye salmon can be found in the All Species Review prepared by the *U.S. v Oregon* Technical Advisory Committee (TAC 1997).

2.1 Species Descriptions and Critical Habitat Designations - Snake River Spring/Summer Chinook Salmon

The SR spring/summer chinook salmon ESU, listed as threatened on April 22, 1992 (57 FR 14653), includes all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, and Salmon rivers. Some or all of the fish returning to several of the hatchery programs are also listed, including those returning to the Tucannon River, Imnaha, and Grande Ronde hatcheries,

and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River. Critical habitat was designated for SR spring/summer chinook salmon on December 28, 1993 (58 FR 68543) and was revised on October 25, 1999 (64 FR 57399).

2.2 General Life Histories - Chinook Salmon

The chinook salmon is the largest of the Pacific salmon. The species' distribution historically ranged from the Ventura River in California to Point Hope, Alaska, in North America, and in northeastern Asia from Hokkaido, Japan, to the Anadyr River in Russia (Healey 1991). Additionally, chinook salmon have been reported in the Mackenzie River area of northern Canada (McPhail and Lindsey 1970). Of the Pacific salmon, chinook salmon exhibit the most diverse and complex life history strategies. Healey (1986) described 16 age categories for chinook salmon, combinations of seven total ages with three possible freshwater ages. This level of complexity is roughly comparable to that seen in sockeye salmon (*O. nerka*), although the latter species has a more extended freshwater residence period and uses different freshwater habitats (Miller and Brannon 1982; Burgner 1991). Gilbert (1912) initially described two generalized freshwater life-history types: "stream-type" chinook salmon, which reside in freshwater for a year or more following emergence, and "ocean-type" chinook salmon, which migrate to the ocean within their first year. Healey (1983, 1991) has promoted the use of broader definitions for ocean-type and stream-type to describe two distinct races of chinook salmon. Healey's approach incorporates life history traits, geographic distribution, and genetic differentiation and provides a valuable frame of reference for comparisons of chinook salmon populations.

The generalized life history of Pacific salmon involves incubation, hatching, and emergence in freshwater; migration to the ocean; and the subsequent initiation of maturation and return to freshwater for completion of maturation and spawning. The juvenile rearing period in freshwater can be minimal or extended. Additionally, some male chinook salmon mature in freshwater, thereby foregoing emigration to the ocean. The timing and duration of each of these stages is related to genetic and environmental determinants and their interactions to varying degrees. Although salmon exhibit a high degree of variability in life-history traits, there is considerable debate regarding the degree to which this variability is shaped by local adaptation or results from the general plasticity of the salmonid genome (Ricker 1972; Healey 1991; Taylor 1991). More detailed descriptions of the key features of chinook salmon life history can be found in Myers et al. (1998) and Healey (1991).

2.3 Population Dynamics and Distribution

In its review of population status and the effects of the proposed action on the listed salmonid ESUs in the Columbia River basin, NMFS is using developing science from several areas including the Cumulative Risk Initiative (CRI) and Viable Salmonid Populations (VSP) paper. Each of these are described briefly below to provide the concept prior to their application in the subsequent ESU specific status discussion.

Cumulative Risk Initiative

To determine the conservation status of the listed ESUs, NMFS is relying increasingly on the evolving scientific analysis contained in the CRI, which is an ongoing effort of the Northwest Fisheries Science Center (NWFSC 2000, NMFS 2000b). The CRI is designed to provide a standardized assessment of extinction risks and the magnitude of improvements required to mitigate these risks. The CRI provides an analytical structure that begins to allow evaluation of the potential effects of management actions aimed at different life stages or sources of mortality. In general, the CRI therefore provides a tool to assess the degree to which survival improvements in a particular sector can be combined with expected improvements in other sectors to provide the necessary overall improvements required for survival and recovery. The CRI analysis was used extensively in the Federal Columbia River Power System (FCRPS) biological opinion and the Basin Wide Recovery Strategy (referred to as the “All-H” paper throughout this biological opinion) to help resolve critical questions regarding the magnitude of required survival improvements and how those survival improvements may be allocated among the various H’s including harvest (NMFS 2000b).

The CRI constructs population models for each species and assesses the risk of extinction for populations and/or for ESUs (depending on the data available). To assess the risk of extinction, the CRI examines the population growth rate from 1980 through the most recent returns, and the year-to-year variability of the population’s productivity.

For both ESUs and individual index stocks, the CRI estimates average annual rate of population change or “lambda.” Lambda, which incorporates year-to-year variability, is the best summary statistic of how rapidly a population is growing or shrinking. A lambda less than 1.0 means the population is declining; a lambda greater than 1.0 means the population is increasing.

By combining lambda with estimates of environmental variability it is possible to calculate “extinction risk metrics.” The CRI assesses the risk of *absolute* extinction, that is, one or no fish for five consecutive years. The analysis also reports the risk of 90% decline in abundance. All extinction metrics are calculated on a 24- and 100-year time frame. For index stocks, where the data represent entire population counts, extinction risks are expressed in terms of the probability of an adult population falling to only one spawner. For ESUs we calculate extinction metrics as the probability of a 90% decline after 24 years and after 100 years, because it is unlikely that entire ESUs have been accurately counted.

The models use survival for each life-stage, which allows a closer examination of the impacts of the various H’s (Hydro, Habitat, Hatcheries and Harvest) on population growth and on corresponding extinction risk. The models can help identify the life stages at which changes in survival will yield the largest impact on population growth rates. By running numerical experiments, the modelers can help put in perspective the impact of a particular activity, such as harvest, on the likelihood of extinction for a given population or ESU.

The CRI models project risks of extinction *if all factors remain the same as they were from*

1980-94. NMFS recognizes that many actions have been taken to improve the survival of these ESUs since 1994, and also recognizes that the base period arguably represents a particularly bad time for ocean survival of most ESUs. In the All-H paper and the FCRPS biological opinion, NMFS has taken into account the management improvements that have been made, as well as the potential benefits from improved ocean conditions of the past few years.

Because the ESA is directed at the conservation of naturally reproducing species and their habitats, NMFS uses the CRI models to determine the risk of extinction of the naturally spawning populations and ESUs. A major source of uncertainty in these analyses is whether and to what extent hatchery-spawned fish contribute to the next generation (certain assumptions must therefore be made about the spawning success of these adults). The uncertainties related to hatchery fish greatly affect estimates of productivity and in turn estimates of extinction risk and the magnitude of survival improvements that may be required. Low and high estimates of lambda were therefore reported based on the assumptions that hatchery-origin fish either contribute nothing to natural production or are equally successful as the natural-origin spawners. The relative productivity of hatchery fish almost certainly varies between populations and falls between the “all or nothing” assumptions.

Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period that varies between subbasin populations. Population trends are projected under the assumption that all conditions will stay the same into the future.

Viable Salmonid Population

Another approach to assessing the status of an ESU and its component populations that is being developed by NMFS is described in a paper related to Viable Salmonid Populations (McElhany et. al. 2000). This paper provides guidance for determining the conservation status of populations and ESUs that can be used in ESA-related processes. In this opinion, we rely on VSP guidance in describing the population or stock structure of each ESU and the related effects of the action.

A population is defined in the VSP paper as a group of fish of the same species spawning in a particular lake or stream (or portion thereof) at a particular season which to a substantial degree do not interbreed with fish from any other group spawning in a different place or in the same place at a different season. Because populations as defined here are relatively isolated, it is biologically meaningful to evaluate the risk of extinction of one population independently from any other. Some ESUs may have only one population while others will have many.

The task of identifying populations within an ESU will require making judgments based on the available information. Information regarding the geography, ecology, and genetics of the ESU are relevant to this determination. This is a task that will generally be taken up as part of the recovery planning process. Recovery planning has just recently gotten underway in the Columbia River Basin. As a result, specific guidance on population structure is not yet available

for most ESUs, although NMFS has recently provided interim guidance regarding geographic spawning aggregations abundance targets (Lohn 2002). It is nonetheless appropriate in the opinion to consider the potential diversity of each ESU and the status of each of the component stocks.

The VSP paper also provides guidance regarding parameters that can be used for evaluating population status including abundance, productivity, spatial structure, and diversity. In this opinion we consider particularly the guidance related to abundance. The paper provides several rules of thumb that are intended to serve as guidelines for setting population specific thresholds (McElhany et al. 2000). The guidance relates to defining both "viable" populations levels and "critical" abundance levels. Although there are still no specific recommendations regarding threshold abundance levels for the effected ESUs, interim abundance targets have been provided (Lohn 2002). These are discussed in the opinion and are used for evaluating population status and the related effects of the action.

2.3.1 Snake River Spring/Summer Chinook Salmon

The present range of spawning and rearing habitat for naturally-spawned Snake River spring/summer chinook salmon is primarily limited to the Grande Ronde, Salmon, Imnaha, and Tucannon Subbasins. Historic populations in the Clearwater Basin were extirpated; spring summer chinook population in the Clearwater were not included as part of the listed ESU. Most Snake River spring/summer chinook salmon enter individual Subbasins from May through September. Juvenile Snake River spring/summer chinook salmon emerge from spawning gravels from February through June (Perry and Bjornn 1991). Typically, after rearing in their nursery streams for about one year, smolts begin migrating seaward in April and May (Bugert *et al.* 1990; Cannamela 1992). After reaching the mouth of the Columbia River, spring/summer chinook salmon probably inhabit nearshore areas before beginning their northeast Pacific Ocean migration, which lasts two to three years. Because of their timing and ocean distribution, these stocks are subject to very little ocean harvest. For detailed information on the life history and stock status of Snake River spring/summer chinook salmon, see Matthews and Waples (1991), NMFS (1991), and 56 FR 29542 (June 27, 1991).

Bevan *et al.* (1994) estimated the number of natural-origin adult Snake River spring/summer chinook salmon in the late 1800s to be more than 1.5 million fish annually. By the 1950s, the population had declined to an estimated 125,000 adults. Escapement estimates indicate that the population continued to decline through the 1970s. Returns were variable through the 1980s, but declined further in recent years. Record low returns were observed in 1994 and 1995. Dam counts were modestly higher from 1996-1998, declined again in 1999, but increased in 2000 and 2001. In 2001, the Lower Granite Dam count of 18,877 natural-origin spring/summer was a record high since 1979. The forecast Lower Granite Dam return of natural-origin spring/summer chinook for 2002 is 29,423 (Table 4). This would be the largest return of wild fish since 1979, and with the exception of 2001, nearly three time higher than any return observed during that period.

For management purposes the spring and summer chinook in the Columbia Basin, including those returning to the Snake River basin, have been managed as separate stocks. Historic databases therefore provide separate estimates for the spring and summer chinook components. Table 4 provides the estimated annual return of adult, natural-origin Snake River basin spring and summer chinook salmon returning to Lower Granite Dam since 1979. A preliminary recovery escapement goal for SR spring/summer chinook of 31,440 (counted at Ice Harbor Dam) was suggested in NMFS' Proposed Recovery Plan (NMFS 1995b). The interim guidance provided by Lohn (2002) sets target abundance levels for 15 geographic spawning aggregations, but these are not intended to replace the preliminary goals. Final goals will be developed through the recovery planning process as described by Lohn (2002).

The Snake River spring/summer chinook salmon ESU consists of 39 local spawning populations (subpopulations) spread over a large geographic area (Lichatowich *et al.* 1993). The number of fish returning to Lower Granite Dam is therefore divided among these subpopulations. The relationship between these subpopulations, and particularly the degree to which straying may occur between these is unknown. It is unlikely that these are all "populations" as defined by McElhany *et. al* (2000) which requires that they be isolated to the extent that the exchange of individuals among the populations does not substantially affect the population dynamics or extinction risk over a 100-year time frame. The 15 spawning aggregations identified by Lohn (2002) are also not necessarily synonymous with the population concept. Nonetheless, monitoring the status of the subpopulations or spawning aggregations provides a more detailed indicator of the species' status than does the general measure of aggregate abundance.

Seven of these subpopulations have been used as index stocks for the purpose of analyzing extinction risk and alternative actions that may be taken to meet survival and recovery requirements. These were selected primarily on the basis of the availability of long time series of abundance information. Recovery and threshold abundance levels have been developed for the index stocks and serve as reference points for comparison to observed escapements (Table 5). They have also been used for assessment purposes in the PATH (Plan for Analyzing and Testing Hypotheses) process. The recovery levels are abundance-related delisting objectives (C. Toole, NMFS, pers. comm., w/ P. Dygert, NMFS, January 21, 2000). The threshold levels were developed by the Biological Requirements Work Group (BRWG 1994) and represent levels at which uncertainties about processes or population enumeration are likely to become significant, and at which qualitative changes in processes are likely to occur. They were specifically not developed as an indicator of pseudo-extinction or as an absolute indicator of a "critical" threshold. Lohn (2002) provided Interim Abundance Targets for several of these index areas and apart from rounding number differences, these are consistent with the previously identified recovery levels (Table 5). Escapement estimates for the index stocks have generally been well below threshold levels in recent years. Spawner escapement in 2001 was better than average for some of these index stocks, but the number of spawners was barely over the threshold level and still well below the recovery levels.

Table 4. Estimates of natural-origin Snake River spring/summer chinook salmon counted at Lower Granite Dam in recent years.

Year	Spring Chinook	Summer Chinook	Total
1979	2,573	2,714	5,287
1980	3,478	2,404	5,882
1981	7,941	2,739	10,680
1982	7,117	3,531	10,648
1983	6,181	3,219	9,400
1984	3,199	4,229	7,428
1985	5,245	2,696	7,941
1986	6,895	2,684	9,579
1987	7,883	1,855	9,738
1988	8,581	1,807	10,388
1989	3,029	2,299	5,328
1990	3,216	3,342	6,558
1991	2,206	2,967	5,173
1992	11,134	441	11,575
1993	5,871	4,082	9,953
1994	1,416	183	1,599
1995	745	343	1,088
1996	1,358	1,916	3,274
1997	2,126	5,137	7,263
1998	5,089	2,913	8,002
1999	1,104	1,584	2,688
2000	3,266	846	4,112
2001	16,477	2,400	18,877
2002	24,124	5,299	29,423
Recovery Escapement Level (counted at Ice Harbor)			31,440

The last inseason update for the forecast for Columbia River mouth upriver spring chinook in 2002 is 292,000 adults. This is the second largest return since counts began in 1937 and is nearly twice the recent 5-year average which includes the record number observed in 2001. The expected return of Snake River spring chinook in 2002 is 149,800 which is also nearly twice the recent 5-year average and also includes the record return of 237,500 in 2001. About 30% of the run will be listed natural-origin spring chinook, but the forecast return (44,900) is nonetheless over 4 times the recent 5-year average and four to nine times higher than the returns in the contributing brood years (4,800 and 9,700 in 1997 and 1998, respectively).

Projected preseason Lower Granite Dam counts and Snake River tributary returns of spring and summer chinook in 2002 are presented in Appendix 1. The substantial return of hatchery-origin fish will provide opportunities to pursue supplementation options designed to help rebuild natural-origin populations subject to constraints related to population diversity and integrity. For example, expected returns to the Imnaha River (2,665 natural-origin and 3,631 listed hatchery-origin fish), and Sawtooth Hatchery (790 listed hatchery-origin fish and 1,143 natural-origin fish) all represent substantial increases over past years and provide opportunities for supplementation in the local basins designed to help rebuild the natural-origin stocks. The forecast return to the Tucannon River is 304 listed hatchery-origin and 297 listed natural-origin fish.

The 2001 upriver summer chinook Columbia River mouth return was 76,400. The 2002 forecast for the upriver summer chinook stocks to the Columbia River mouth was updated by TAC to 145,000, which is nearly four times the average return over the recent 5-year average of 36,540. The original 2002 forecast for natural-origin fish destined for the Snake River and is 6,600, and is higher than brood year escapements in 1997 and 1998 of 5,137 and 2,913, respectively. It compares to the recent 5-year average of 5,235. This number has not been updated by TAC inseason.

The probability of meeting survival and recovery objectives for SR spring/summer chinook salmon under various future operation scenarios for the hydrosystem was analyzed through a process referred to as PATH (Plan for Analyzing and Testing Hypotheses) (Marmorek et al. 1998). The scenarios analyzed focused on status quo management and options that emphasized either juvenile transportation or hydro-project drawdown. PATH also included sensitivity analyses to alternative harvest rates and habitat effects. PATH estimated the probability of survival and recovery for the seven index stocks using the recovery and escapement threshold levels as abundance indicators. The forward simulations estimated the probability of meeting the survival thresholds after 24 and 100 years.

A 70% probability of exceeding the threshold escapement levels was used to assess survival. Recovery potential was assessed by comparing the projected abundance to the recovery abundance levels after 48 years. A 50% probability of exceeding the recovery abundance levels was used to evaluate recovery by comparing the 8-year mean projected abundance. In general, the survival and recovery standards were met for operational scenarios involving drawdown, but were not met under status quo management or for the scenarios that relied on juvenile transportation (Marmorek et al. 1998). If the most conservative harvest rate schedule was assumed, transportation scenarios came very close to meeting the survival and recovery standards.

Table 5. Adult spawners for Snake River spring/summer chinook index stocks, recovery levels identified by NMFS (1995b), and interim critical escapement thresholds suggested by BRWG (1994). Bear Valley, Marsh, Sulphur and Minam are spring chinook index stocks. Poverty Flats and Johnson are summer run index chinook stocks. Imnaha has an intermediate run timing. The 2002 returns are based on the preseason forecast. Estimates for 2001 are preliminary or not yet available.

Brood year	Bear Valley	Marsh	Sulphur	Minam	Imnaha	Poverty Flats	Johnson
1979	215	83	90	40	238	76	66
1980	42	16	12	43	183	163	55
1981	151	115	43	50	453	187	102
1982	83	71	17	104	590	192	93
1983	171	60	49	103	435	337	152
1984	137	100	0	101	557	220	36
1985	295	196	62	625	699	341	178
1986	224	171	385	357	479	233	129
1987	456	268	67	569	448	554	175
1988	1109	395	607	493	606	844	332
1989	91	80	43	197	203	261	103
1990	185	101	170	331	173	572	141
1991	181	72	213	189	251	538	151
1992	173	114	21	102	363	578	180
1993	709	216	263	267	1178	866	357
1994	33	9	0	22	115	209	50
1995	16	0	4	45	97	81	20
1996	56	18	23	233	219	135	49
1997	225	110	43	140	474	363	236
1998	372	164	140	122	159	396	119
1999	72	0	0	96	282	153	49
2000	313	65	13	na	na	350	63
2001	391	195	38				177
Recovery Levels	900	450	300	450	850	850	300
BRWG Threshold	300	150	150	150	300	300	150

More recent analyses, generally referred to as the Cumulative Risk Initiative (CRI), have been developed by the NMFS' Northwest Regional Science Center. The CRI is designed to provide a standardize tool for assessing stock status and survival improvement necessary to meet survival and recovery objectives. For the SR spring/summer chinook salmon ESU as a whole, NMFS estimates that the median population growth rate (λ) over the base period¹ ranges from 0.96 to 0.80, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared

¹Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period beginning in 1980 and including 1999 adult returns. Population trends are projected under the assumption that all conditions will stay the same into the future.

to the effectiveness of fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000a). NMFS has also estimated median population growth rates and the risk of absolute extinction for the seven spring/summer chinook salmon index stocks,² using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e., hatchery effectiveness = 0), the risk of absolute extinction within 100 years for the wild component ranges from zero for Johnson Creek to 0.78 for the Imnaha River (Table B-5 in McClure et al. 2000a). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years ranges from zero for Johnson Creek to 1.00 for the wild component in the Imnaha River (Table B-6 in McClure et al. 2000a).

In its recent biological opinion regarding the FCRPS, NMFS summarized the prospects for survival and recovery in terms of the estimated percent change in survival needed to achieve survival and recovery indicator criteria after implementing the hydro survival improvements of the Reasonable and Prudent Alternative (NMFS 2000b). These are then identified as the offsite mitigation performance standards for the FCRPS (see section 9.2.2.2.2 in NMFS 2000b). In general, the low and high values in the table reflect uncertainty about the effectiveness of hatchery spawners in the wild, although the summary statistics do not reflect the full measure of uncertainty in the estimates. These estimates suggest that three of the seven SR spring/summer chinook index stocks require no additional survival changes beyond those expected through modification of the hydrosystem under the RPA to meet the survival and recovery indicator criteria. The other four index stocks require additional survival improvements ranging from 0 to 66% (Table 6). These survival improvements are expected to be achieved through offsite mitigation activities. Inherent in the overall analysis is the assumption that harvest impacts will remain at the levels reflected in the most recent biological opinions. Generally speaking, increases in the harvest rates, particularly over the long-term, will change these statistics and increase the level of survival improvements required in other sectors. Harvest increases, beyond those assumed, would otherwise simply reflect a further increase of risk to the species.

3.0 ENVIRONMENTAL BASELINE

The purpose of this section is to identify “the past and present effects of all Federal, State, or private activities in the action area, the anticipated effects of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the effect of State or private actions which are contemporaneous with the consultation in process” (50 CFR § 402.02, definition of *effects of the action*). These factors affect the species’ environment or critical habitat in the action area. The factors are described in relation to the action area biological requirements of the species.

² McClure et al. (2000b) have calculated population trend parameters for additional SR spring/summer chinook salmon stocks.

Table 6. Estimated percentage change (i.e., additional improvement in life-cycle survival) needed to achieve survival and recovery indicator criteria after implementing the hydro survival improvements in the RPA. (A value of 26, for example, indicates that the egg-to-adult survival rate, or any constituent life-stage survival rate, must be multiplied by a factor of 1.26 to meet the indicator criteria.)

Spawning Aggregation	Needed survival Change	
	Low	High
Snake River Spring/Summer		
Bear Valley/Elk creeks	0	0
Imnaha River	26	66
Johnson Creek	0	0
Marsh Creek	0	12
Minam River	0	28
Poverty Flats	0	0
Sulphur Creek	0	5

Note: Low and High estimates are based on a range of assumptions, as described in the text.

In addition to harvest activities, the activities having the greatest effect on the environmental baseline generally fall into four categories: hydropower system impacts on juvenile out-migration and adult return migration; habitat degradation effects on water quality and availability of adequate incubation and rearing locations; adverse genetic and competitive impacts from artificial production programs; and fluctuations in natural conditions.

3.1 Description of Action Area

The action area relative to adult Snake River basin salmonids is the part of their habitat that is affected by the proposed treaty-Indian and non-Indian fisheries in the Snake River, as described in the biological assessment (LeFleur 2002a and Calica 2002a) and subsequent addendums (LeFleur 2002b, LeFleur 2002c, Calica 2002b).

3.2 Biological Requirements in Action Area

Of the four listed salmonid ESUs in the Snake River basin, only spring/summer chinook salmon are affected by the proposed fisheries considered in this opinion. Biological requirements during the adult life history stage are obtained through access to essential features of critical habitat. Essential features include adequate 1) substrate (especially spawning gravel), 2) water quality, 3)

water quantity, 4) water temperature, 5) water velocity, 6) cover/shelter, 7) food, 8) riparian vegetation, 9) space, and 10) migration conditions (58 FR 68546 for Snake River salmon and 65 FR 773 for all other Columbia River basin salmonids). These features are nearly identical to those characterized as Essential Fish Habitat (EFH) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (PFMC 1999).

3.2.1 Essential Features of Critical Habitat in Action Area

The sections below describe essential features of critical habitat for each of the relevant habitat types: 1) adult migration corridors, and 2) spawning areas in the action area discussed in the following sections.

Adult Migration Corridors

Essential features of critical habitat for adult migration corridors include all the essential features of critical habitat for juvenile migration corridors (above), except for adequate food.

Spawning Areas

Essential features of critical habitat for spawning areas include all the essential features of critical habitat for juvenile rearing areas (above), with the addition of adequate substrate and the exception of adequate food.

3.2.2 Adequacy of Habitat Conditions in Critical Habitat

Regulations implementing Section 7(a)(2) of the ESA define “destruction or adverse modification” as “a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species.” Adverse effects on a constituent element of critical habitat generally do not result in a determination of “adverse modification” unless that loss, when added to the environmental baseline, is likely to result in an appreciable diminishment of the value of the critical habitat for both the survival and the recovery of the listed species (50 CFR Section 402.02).

Quantitatively defining a level of adequacy through specific, measurable standards is difficult for many of these biological requirements. In many cases, the absolute relationship between the critical element and species survival is not clearly understood, thus limiting development of specific, measurable standards. In contrast, some parameters are generally well known in the fisheries literature (e.g., thermal tolerances). Others are developed in this biological opinion (e.g., a temperature objective at Lower Granite Dam). For the remaining action-area biological requirements, the effects of any adverse impacts on essential features of critical habitat are considered in more qualitative terms.

3.3 Factors Affecting Species' Environment in Action Area

3.3.1 Hydrosystem Effects

Columbia River basin anadromous salmonids, especially those above Bonneville Dam, have been dramatically affected by the development and operation of the Federal Columbia River Power System (FCRPS). Storage dams have eliminated spawning and rearing habitat and have altered the natural hydrograph of the Snake and Columbia rivers, decreasing spring and summer flows and increasing fall and winter flows. Power operations cause fluctuation in flow levels and river elevations, affecting fish movement through reservoirs and riparian ecology and stranding fish in shallow areas. The eight dams in the migration corridor of the Snake and Columbia rivers alter smolt and adult migrations. Smolts experience a high level of mortality passing through the dams. The dams also have converted the once-swift river into a series of slow-moving reservoirs, slowing the smolts' journey to the ocean and creating habitat for predators. Water velocities throughout the migration corridor are now far more dependent on volume runoff than before development of the mainstem reservoirs.

There have been numerous changes in the operation and configuration of the FCRPS as a result of ESA consultations between the Action Agencies (Corps of Engineers, Bureau and Bonneville Power Administration) and the services (NMFS and USFWS). The changes have improved survival for the listed fish migrating through the Snake and Columbia rivers. Increased spill at all FCRPS dams allows smolts to avoid both turbine intakes and bypass systems. Increased flow in the mainstem Snake and Columbia rivers provides better inriver conditions for smolts. The transportation of smolts from the Snake River has also been improved by the addition of new barges and modification of existing barges.

In addition to spill, flow, and transportation improvements, the Corps implemented numerous other improvements to project operations and maintenance at all Columbia and Snake River dams. These improvements, such as operating turbines at peak efficiency, new extended-length screens at McNary, Little Goose, and Lower Granite dams, and extended operation of bypass screens, are discussed in greater detail in the 2000 FCRPS Biological Opinion (NMFS 2000b).

It is possible to quantify the survival benefits accruing from these many actions for each of the listed ESUs. For SR spring/summer chinook smolts migrating inriver, the estimated survival through the hydrosystem is now between 40% and 60%, compared with an estimated survival rate during the 1970s of 5% to 40%. SR steelhead have probably received a similar benefit because their life history and run timing are similar to that of spring/summer chinook (NMFS 2000b). It is more difficult to obtain direct data and compare survival improvements for fish transported from the Snake River, but there are likely to be improvements for transported fish as well. It is reasonable to expect that the improvements in operation and configuration of the FCRPS will benefit all listed Columbia basin salmonids and that the benefits will be greater the farther upriver the ESU. However, further improvements are necessary because the Federal hydrosystem continues to cause a significant level of mortality for some ESUs. In 2000 NMFS

completed a reinitiated consultation on the FCRPS (NMFS 2000b) and the related all-H paper (Federal Caucus 2000). These provide direction for the future configuration and operation of the FCRPS and a blueprint for actions required in other sectors considered necessary for the survival and recovery of listed species.

3.3.2 Habitat Effects

The quality and quantity of freshwater habitat in much of the Snake River basin have declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydrosystem development, mining, and urbanization have radically changed the historical habitat conditions of the basin. With the exception of fall chinook, which generally spawn and rear in the mainstem, salmon and steelhead spawning and rearing habitat is found in tributaries to the Snake River. Anadromous fish typically spend from a few months to 3 years rearing in freshwater tributaries. Depending on the species, they spend from a few days to 1 or 2 years in the Columbia River estuary before migrating out to the ocean and another 1 to 4 years in the ocean before returning as adults to spawn in their natal streams.

Most of the water bodies in Oregon, Washington, and Idaho that are on the 303(d) list do not meet water quality standards for temperature. Water quality in streams throughout the Snake River basin has been degraded by human activities such as dams and diversion structures, water withdrawals, farming and grazing, road construction, timber harvest activities, mining activities, and urbanization. Temperature alterations affect salmonid metabolism, growth rate, and disease resistance, as well as the timing of adult migrations, fry emergence, and smoltification. Many factors can cause high stream temperatures, but they are primarily related to land-use practices rather than point-source discharges. Some common actions that result in high stream temperatures are the removal of trees or shrubs that directly shade streams, excessive water withdrawals for irrigation or other purposes, and warm irrigation return flows. Loss of wetlands and increases in groundwater withdrawals have contributed to lower base-stream flows, which in turn contribute to temperature increases. Channel widening and land uses that create shallower streams also cause temperature increases.

Pollutants also degrade water quality. Salmon require clean gravel for successful spawning, egg incubation, and emergence of fry. Fine sediments clog the spaces between gravel and restrict the flow of oxygen-rich water to the incubating eggs. Excess nutrients, low levels of dissolved oxygen, heavy metals, and changes in pH also directly affect the water quality for salmon and steelhead.

Water quantity problems are also a significant cause of habitat degradation and reduced fish production. Hundreds of thousands of acres of land in the basin are irrigated. Although some of the water withdrawn from streams eventually returns as agricultural runoff or groundwater recharge, crops consume a large proportion. Withdrawals affect seasonal flow patterns by removing water from streams in the summer (mostly May through September) and restoring it to surface streams and groundwater in ways that are difficult to measure. Withdrawing water for

irrigation, urban, and other uses can increase temperatures, smolt travel time, and sedimentation. Return water from irrigated fields can introduce nutrients and pesticides into streams and rivers.

On a larger landscape scale, human activities have affected the timing and amount of peak water runoff from rain and snowmelt. Forest and range management practices have changed vegetation types and density, which can affect timing and duration of runoff. Many riparian areas, flood plains, and wetlands that once stored water during periods of high runoff have become developed. Urbanization paves over or compacts soil and increases the amount and pattern of runoff reaching rivers and streams.

Many tributaries have been significantly depleted by water diversions. In 1993, fish and wildlife agency, Tribal, and conservation group experts estimated that 80% of 153 Oregon tributaries had low-flow problems (two-thirds caused at least in part by irrigation withdrawals) (Oregon Water Resources Department 1993). The NWPPC showed similar problems in many Idaho, Oregon, and Washington tributaries (NWPPC 1992).

Blockages that stop the downstream and upstream movement of fish exist at many agricultural, hydrosystem, municipal/industrial, and flood control dams and barriers. Highway culverts that are not designed for fish passage also block upstream migration. Migrating fish are diverted into unscreened or inadequately screened water conveyances or turbines, resulting in unnecessary mortality. While many fish-passage improvements have been made in recent years, manmade structures continue to block migrations or kill fish throughout the basin.

Land ownership has played a part in habitat and land use changes. Federal lands are generally forested and influence upstream portions of the watersheds. While there is substantial habitat degradation across all ownerships, in general, habitat in many headwater stream sections is in better condition than in the largely non-Federal lower portions of tributaries (Doppelt et al. 1993, Frissell 1993, Henjum et al. 1994, Quigley and Arbelbide 1997). In the past, valley bottoms were among the most productive fish habitats in the basin (Stanford and Ward 1992, Spence et al. 1996, ISG 1996). Today, agricultural and urban land development and water withdrawals have significantly altered the habitat for fish and wildlife. Streams in these areas typically have high water temperatures, sedimentation problems, low flows, simplified stream channels, and reduced riparian vegetation.

Mainstem habitats of the Snake River have been affected by impoundments that have inundated large amounts of spawning and rearing habitat. Historically, fall chinook salmon spawned in the mainstem near The Dalles, Oregon, upstream to the Pend Oreille River in Washington and the Kootenai River in Idaho, in the Snake River downstream of Shoshone Falls, and upstream from the mouth of the Snake River to Grand Coulee Dam. Current mainstem production areas for fall chinook are mostly confined to the Hanford Reach of the mid-Columbia River and to the Hells Canyon Reach of the Snake River, with minor spawning populations elsewhere in the mid-Columbia, below the lower Snake River dams, and below Bonneville Dam. Mainstem habitat in the Snake River has been reduced, for the most part, to a single channel, floodplains have been

reduced in size, off-channel habitat features have been lost or disconnected from the main channel, and the amount of large woody debris (large snags/log structures) in rivers has been reduced. Most of the remaining habitats are affected by flow fluctuations associated with reservoir management.

The Columbia River estuary has also been changed by human activities. Historically, the downstream half of the estuary was a dynamic environment with multiple channels, extensive wetlands, sandbars, and shallow areas. The mouth of the Columbia River was about 4 miles wide. Winter and spring floods, low flows in late summer, large woody debris floating downstream, and a shallow bar at the mouth of the Columbia River kept the environment dynamic. Today, navigation channels have been dredged, deepened and maintained, jetties and pile-dike fields have been constructed to stabilize and concentrate flow in navigation channels, marsh and riparian habitats have been filled and diked, and causeways have been constructed across waterways. These actions have decreased the width of the mouth of the Columbia River to 2 miles and increased the depth of the Columbia River channel at the bar from less than 20 to more than 55 feet. Sand deposition at river mouths has extended the Oregon coastline approximately 4 miles seaward and the Washington coastline approximately 2 miles seaward (Thomas 1981).

More than 50% of the original marshes and spruce swamps in the estuary have been converted to industrial, transportation, recreational, agricultural, or urban uses. More than 3,000 acres of intertidal marsh and spruce swamps have been converted to other uses since 1948 (Lower Columbia River Estuary Program 1999). Many wetlands along the shore in the upper reaches of the estuary have been converted to industrial and agricultural lands after levees and dikes were constructed. Furthermore, water storage and release patterns from reservoirs upstream of the estuary have changed the seasonal pattern and volume of discharge. The peaks of spring/summer floods have been reduced, and the amount of water discharged during winter has increased.

Studies begun in 1997 by the Oregon Cooperative Fish and Wildlife Research Unit, the USGS, and CRITFC have shown that fish-eating birds that nest on islands in the Columbia River estuary (Caspian terns, double-crested cormorants, and glaucous-winged gulls) are significant avian predators of juvenile salmonids. Researchers estimated that the tern population on Rice Island (16,000 birds in 1997) consumed 6 to 25 million outmigrating smolts during 1997 (Roby et al. 1998) and 7 to 15 million during 1998 (Collis et al. 1999). The observed levels of predation prompted the regional fish and wildlife managers to investigate the feasibility of management actions to reduce the impacts. Early management actions appear to have reduced predation rates; researchers estimate that terns consumed 7.3 million smolts during 1999 (Columbia Basin Bird Research 2000). Because Rice Island is a dredged material disposal site in the Columbia River estuary, created by the Corps under its Columbia River Channel Operation and Maintenance Program, the effects of tern predation on the survival and recovery of listed salmonids are considered in a separate consultation on that program. This factor is considered part of the environmental baseline on effects of the FCRPS.

The All-H Paper outlines a broad range of current habitat programs. Because most of the basin's

anadromous fish spawning habitat is in Federal ownership, Federal land management programs are of primary importance. Current management is governed by an ecosystem-based aquatic habitat and riparian-area management strategy known as PACFISH, and associated biological opinions. This interim strategy covers the majority of the basin accessible to anadromous fish and includes specific prescriptions designed to halt habitat degradation.

The All-H Paper also outlines a large number of non-Federal habitat programs. However, because non-Federal habitat is managed predominantly for private rather than public purposes, expectations for non-Federal habitat are harder to assess. Degradation of habitat for listed fish from activities on non-Federal lands is likely to continue to some degree over the next 10 years, although at a reduced rate due to state, Tribal, and local recovery plans.

3.3.3 Hatchery Effects

For more than 100 years, hatcheries in the Pacific Northwest have been used to replace natural production lost as a result of the FCRPS and other development, not to protect and rebuild natural populations. As a result, most salmon populations in this region are primarily hatchery fish. In 1987, for example, 95% of the coho, 70% of the spring chinook, 80% of the summer chinook, 50% of the fall chinook, and 70% of the steelhead returning to the Columbia Basin originated in hatcheries (Columbia Basin Fish and Wildlife Authority 1990).

While hatcheries certainly have contributed greatly to the overall numbers of salmon, only recently has the effect of hatcheries on native wild populations been demonstrated. In many cases, these effects have been substantial. For example, production of hatchery fish, among other factors, has contributed to the 90% reduction in wild coho salmon runs in the lower Columbia River over the past 30 years (Flagg et al. 1995). Hatcheries have traditionally focused on providing fish for harvest, with less attention given to identifying and resolving factors causing declines of native runs.

NMFS has identified four primary categories of risk that hatcheries can pose on wild-run salmon and steelhead: 1) ecological effects, 2) genetic effects, 3) overharvest effects, and 4) masking effects (NMFS 2000b). Ecologically, hatchery fish can increase predation on, displace, and/or compete with wild fish. These effects are likely to occur when fish are released in poor condition and do not migrate to marine waters, but rather remain in the streams for extended rearing periods, during which they may prey on or compete with wild fish. Hatchery fish also may transmit hatchery-borne diseases, and hatcheries themselves may release diseases into streams via water effluents.

Genetically, hatchery fish can affect the genetic variability of native fish via interbreeding, either intentionally or accidentally. Interbreeding can also result from the introduction of native stocks from other areas. Theoretically, interbred fish are less adapted to and productive within the unique local habitats where the original native stock evolved.

In many areas, hatchery fish provide increased fishery opportunities. When wild fish mix with

hatchery stock, fishing pressure can lead to overharvest of smaller or weaker wild stocks. Further, when migrating adult hatchery and wild fish mix on the spawning grounds, the health of the wild runs and the condition of the habitat's ability to support runs can be overestimated, because the hatchery fish mask surveyors' ability to discern actual wild run conditions.

NMFS determined that there is a need for immediate hatchery reform and conservation actions (Federal Caucus 2000). Federal agencies are working with the NWPPC to accelerate funding and implementation of the reform measures from the hatchery biological opinions and related actions that should proceed over the next 1 to 3 years. Such reforms will be pursued in the context of the Hatchery and Genetic Management Plans (HGMP). The HGMP is a tool for defining goals and objectives of a particular hatchery, and its relationship to prioritized basin objectives, including harvest opportunities and wild stock performance. Specifically, each HGMP should ensure that genetic broodstock selected is appropriate, that it minimizes the potential for adverse ecological effects on wild populations, and that it is integrated into basinwide strategies to meet objectives of all Hs.

3.3.4 Harvest Effects

3.3.4.1 Ocean Fisheries

Impacts from ocean fisheries on listed spring/summer chinook and sockeye salmon have been considered in recent biological opinions. NMFS (1996b) concluded that it is highly unlikely that any Snake River sockeye salmon are taken in salmon fisheries off the west coast and that, although Snake River spring/summer chinook may on occasion be taken, the overall ocean exploitation rate is likely less than 1%. NMFS (1998b) also reviewed the potential impacts to steelhead for ocean salmon fisheries. Since steelhead are only rarely caught in these fisheries, it is unlikely that the listed steelhead ESUs would be impacted.

3.3.4.2 Columbia River Mainstem Fisheries

Most mainstem harvest impacts to listed Snake River spring/summer chinook will already have occurred in 2002 prior to the fisheries addressed in this opinion. Specifically, Snake River spring/summer chinook salmon are taken in treaty Indian and non-Indian fisheries conducted in the winter, spring, and summer fisheries in the lower Columbia River mainstem, downstream of the mouth of the Snake River. These impacts were considered in a previous biological opinion (NMFS 2001c). In the biological opinion for winter/spring/summer mainstem Columbia River fisheries NMFS developed an abundance-based harvest rate schedule that allows for higher harvest rates in years of high abundance. With the returns in 2002, the variable harvest rate schedule allowed for harvest of up to 11% of naturally-produced Snake River spring chinook and up to 5 % of listed Snake River summer chinook salmon (NMFS 2001c).

The final inseason run size update for upriver spring chinook salmon (which includes fish destined for the Snake River basin) is 294,900 adults. The actual harvest rate on Snake River spring chinook will likely be slightly higher than the authorized in the Columbia River Mainstem

Biological Opinion (NMFS 2001c). The projected harvest rate in tribal fisheries is about 11.1% with an additional harvest rate on wild fish of 2.0% in non-Indian fisheries. The return of summer chinook to the lower mainstem began in early June within anticipated mainstem harvest rates of 1.7%.

3.3.4.3 Tributary Recreational Fisheries

Recreational fisheries which may take listed salmonids will also occur in the Snake River basin in 2002. These fisheries are operated by the states of Oregon, Washington, and Idaho, under state regulations. Idaho recreational fisheries were considered previously pursuant to a section 10(a)(1)(B) permit application. Permit 1233 authorizes take associated with Idaho fisheries. Washington State (Atkins 2001) and Oregon State (Smith 2001) submitted their Fishery Management and Evaluation Plan (FMEP) to seek authorization under section 4(d) of the ESA for their recreational fisheries in the Snake River basin.

Although impacts associated with Oregon, Washington, and Idaho fisheries are not subject to consultation in this opinion, the resulting impacts, particularly those to Snake River spring/summer chinook salmon, are discussed briefly here and in the effects analysis to provide a more complete context for analyzing the fisheries that are considered here.

Idaho's mainstem Salmon River is open to general (resident species) recreational fishing year-round, from the mouth upstream to 200 yards downstream of the Sawtooth Hatchery weir, except for the 15 mile stretch from the mouth of the Middle Fork downstream. The only significant recreational salmon fisheries in the Salmon River Subbasin are those which occur in the Little Salmon/Rapid River and in the SFSR near the hatchery weir. Any fishery which Idaho may propose to harvest unlisted chinook salmon of hatchery-origin must be reviewed by NMFS for compliance with the Section 10 permit.

The state of Idaho has been authorized incidental take of listed spring/summer chinook salmon, fall chinook salmon, and sockeye salmon in recreational fisheries directed at unlisted salmon and kokanee. General season fisheries have the following authorizations: A total of 10 adult or jack spring/summer chinook salmon may be retained in certain general season fisheries, with an additional catch-and-release of up to 56 adults or jacks resulting in 5 mortalities. The take of up to 500 juvenile spring/summer chinook salmon is also anticipated in Idaho recreational fisheries conducted under General Fishing regulations, with the associated mortalities of up to 50 juveniles. Note that this take affects fish of a brood year subsequent to those of adults returning in 2001. Therefore, such juvenile impacts should remain in context of the total impacts to, and resultant prospects for replacement and survival of, the appropriate brood year upon return as adults. Evaluation of impacts to 2002 adult returns (brood years 1997 and 1998) must likewise include consideration of impacts to juveniles of brood years contributing to those returns; NMFS (1999) estimates that take of juvenile spring/summer chinook salmon represents less than 0.01 percent of the fish estimated to be produced in the Snake River basin.

Anadromous Salmon Fishing Regulation in Idaho authorize the catch-and-release of adult,

threatened, Snake River spring/summer chinook in the Rapid River/Little Salmon River fishery targeting non-listed hatchery-origin spring/summer chinook. In 2002 this fishery is anticipated to result in about ten mortalities.

In 2002, the state of Washington is considering a fishery for spring chinook in two areas: 1- the area from Texas Rapids (downstream from Little Goose Dam) to 3 miles above Little Goose Dam, and 2- The Snake River from the Southway Bridge Crossing the snake River at Lewiston/Clarkson upstream to Heller Bar concrete boat ramp. Regulations included the use of barbless hooks and only fish with an adipose fin clip could be retained. The fishery occurred in the month of May. Impacts to listed spring chinook will be included in the non-Indian 2% allocation for mainstem Columbia River fisheries (NMFS 2001c) and are accounted for as part of the impacts associated with lower river fisheries.

3.3.4.2 Previous Snake River Fisheries Impacts

Impacts from past Snake River basin fisheries on listed spring/summer since 1992 are summarized in Table 7. Harvest rates exceeded harvest guidelines only in 1998 in the South Fork Salmon River. Impact to listed spring/summer chinook salmon in all other years and subbasins were well within past guidelines (LeFleur 2001a, Table 7).

3.4 Natural Conditions

Changes in the abundance of salmonid populations are substantially affected by changes in the freshwater and marine environments. For example, large-scale climatic regimes, such as El Niño, affect changes in ocean productivity. Much of the Pacific Coast was subject to a series of very dry years during the first part of the 1990s. In more recent years, severe flooding has adversely affected some stocks. For example, the low return of Lewis River bright fall chinook salmon in 1999 is attributed to flood events during 1995 and 1996.

Chinook salmon are exposed to high rates of natural predation, particularly during freshwater rearing and migration stages. Ocean predation may also contribute to significant natural mortality, although the levels of predation are largely unknown. In general, salmonids are prey for pelagic fishes, birds, and marine mammals, including harbor seals, sea lions, and killer whales. There have been recent concerns that the rebound of seal and sea lion populations, following their protection under the Marine Mammal Protection Act of 1972, has resulted in substantial mortality for salmonids. In recent years, for example, sea lions have learned to target UWR spring chinook salmon in the fish ladder at Willamette Falls. In some locations sea lions and harbor seals have learned to pull fish trapped in gillnets before they can be landed.

A key factor substantially affecting many West Coast stocks has been the general pattern of a 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood. The pattern of response to these changing ocean conditions has differed among stocks, presumably due to differences in their ocean timing and distribution. It is presumed that survival is driven largely by events occurring between ocean entry and recruitment to a subadult

life stage. One indicator of early ocean survival can be computed as a ratio of coded-wire tag (CWT) recoveries of subadults relative to the number of CWTs released from that brood year. Time series of survival rate information for UWR spring chinook, Lewis River fall chinook salmon show highly variable or declining trends in early ocean survival, with very low survival rates in recent years (NMFS 2001d).

Table 7. Annual tribal spring/summer chinook harvest rates in the South Fork Salmon, Grand Ronde and East Fork Clearwater rivers, and in Lookingglass and Clear creeks and number of fish harvested for Rapid River between 1992 and 2001. Harvest guidelines were exceeded once in 1998 (Bold).

	South Fork Salmon Total (hatch. + wild)	Grande Ronde Wild	Lookingglass Creek Wild	North Fork Clearwater Wild	Clear Creek Wild	Rapid River Wild
1992	3.6%	0%	0%	0%	0%	0
1993	10.1%	0%	0%	0%	0%	0
1994	1.5%	0%	0%	0%	0%	0
1995	1.0%	0%	0%	0%	0%	0
1996	2.5%	0%	0%	0%	0%	0
1997	7.0%	0%	0%	0%	0%	0
1998	12.1%	0%	0%	0%	0%	15 fish
1999	5.8%	0%	0%	0%	0%	2 fish ^{1/}
2000	15.0%	0%	0%	0%	0%	4 fish ^{2/}
2001	13%	0%	0%	0%	0%	

^{1/} fifteen wild fish released

^{2/} 38 wild fish released

Recent evidence suggests that marine survival of salmonids fluctuates in response to 20- to 30-year long periods of either above or below average survival that is driven by long-term cycles of climatic conditions and ocean productivity (Cramer et al. 1999). This has been referred to as the Pacific Decadal Oscillation (PDO). It is apparent that ocean conditions that affect the productivity of Northwest salmon populations have been in a low phase of the cycle for some time. The variation in ocean conditions has been an important contributor to the decline of many stocks. However, the survival and recovery of the species depends on their ability to persist through periods of low ocean survival when stocks may depend on better quality freshwater habitat and lower relative harvest rates.

Recent information suggests that ocean conditions may have undergone a substantive change beginning in 1999 as indicated by cooler ocean temperatures, changes in species composition of

zooplankton, fewer pelagic predators such as hake and mackerel, and the increased abundance of bait fish (B. Emmett, NMFS, pers. comm., P. Dygert, NMFS, June 7, 2001). The most relevant indicator to this consultation has been the unprecedented return of upriver spring chinook in 2000, 2001 and 2002. The return in 2001 of over 400,000 and in 2002 of over 292,000 upriver spring chinook to the Columbia River are the highest returns by far since counts began at Bonneville Dam in 1938. Jack counts in 2002 were moderately high (6,477), and have been a reliable indicator of the recent returns, suggesting that there will be a fairly strong return in 2003.

In contrast, the extraordinary drought conditions in 2001 will adversely affect future return. The available water in the upper Columbia River basin was 50-60% of normal and resulted in some of the lowest flow conditions on record. These conditions probably had the greatest effect on upriver stocks that had to migrate through the mainstem Columbia and Snake rivers past many dams. The juveniles that passed down river during the 2001 spring and summer out-migration were likely significantly affected. At this point it is too early to tell how apparent change in ocean survival and poor out-migration conditions in 2001 will interact to affect returns after 2002. However, the effects of poor outmigrating conditions in 2001 would most directly affect fish returning in 2003 and 2004.

Although it is not possible to review here the relative importance of each of these factors on each ESU or stocks within the Snake River basin, it is clear that it is the combined effect of all of the H's and changing survival conditions that has led to the decline and resulting current status of the species of concern. In this opinion, NMFS focuses on harvest, in the context of the environmental baseline and the current status of the species. Although harvest can be reduced in response to the species' depressed status and the reduced productivity that results from the degradations related to other human activities, the recovery of the listed species depends on improving the productivity of the natural populations in the wild. These improvements can only be made by addressing the factors of decline related to all of the H's that will be the subject of future opinions and recovery planning efforts.

3.5 Expected Future Performance

Most ESUs in the Columbia Basin will experience improved survivals as a result of improvements in FCRPS operations and configuration, habitat improvements on Federal lands, improvements in hatchery practices, and improvements in harvest measures. Notwithstanding these improvements, however, is the fact that environmental conditions are still generally quite poor with respect to salmonid survival in a number of their life phases. In fact, for many stocks, survivals must improve by an order of magnitude in order for the ESUs to survive and recover. The long-term survival of many ESUs from the upper Columbia Basin will depend upon improvements in ocean and habitat conditions and conditions in the hydropower corridor. For mid-Columbia Basin stocks, it will depend on improvements in ocean conditions and habitat, as well as improvements in the hydropower corridor. For lower Columbia Basin stocks, it will depend on improvements in ocean conditions and habitat. For the sockeye, chinook, and steelhead ESUs considered in this opinion, harvest has been reduced to the point that it is not a major factor limiting recovery of Columbia Basin stocks. Nevertheless, harvest reductions will

continue to be a necessary and important contributor to the species' survival through the current bottleneck.

4.0 EFFECTS OF THE ACTION

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA and in 50 CFR §402.02. This section of the Biological Opinion applies those standards in determining whether the proposed fisheries are likely to jeopardize the continued existence of one or more of the threatened or endangered salmon and steelhead species (ESUs) that may be adversely affected by the fisheries. This analysis considers the direct, indirect, interrelated and interdependent effects of the proposed fisheries and compares them against the Environmental Baseline to determine if the proposed fisheries will appreciably reduce the likelihood of survival and recovery of these listed salmon in the wild.

In making the jeopardy determinations NMFS also considered the available information on the population or stock structure of each ESU when appropriate by reviewing both the status and impacts to components of the ESU and the impacts on the ESU as a whole. Many of the fisheries considered in this opinion are terminal tributary fisheries that target particular stocks. Unlike mixed stock fisheries such as those in the Columbia River mainstem that affect the ESU in general, terminal fisheries can be evaluated against information that is specifically related to particular stocks including critical threshold levels, abundance objectives, and preseason and inseason estimates of return. These stock specific circumstances were considered in evaluating the proposed fisheries. NMFS' jeopardy determinations are based on quantitative assessments where possible and more qualitative considerations where necessary. Different methods and different types of information are used, reflecting what is available or can be developed as part of a consultation. NMFS expects that more quantitative and holistic analyses and risk assessments will become available in time. NMFS sought to develop analyses that considered the status of the species, the environmental baseline, and the effects of the proposed actions, particularly given the context of other harvest activities that are likely to affect the species.

4.1 Effects on Critical Habitat

Critical habitat has been designated for Snake River basin spring/summer chinook salmon. The essential features of the critical habitat are set out in the Environmental Baseline section of this opinion. While harvest activities do affect passage in that fish are intercepted, those impacts are accounted for explicitly in the following analyses regarding harvest related mortality. Most of the harvest related activities occur from boats or along river banks and will be of short duration. Gears that are used include primarily hook-and-line, gaff, spears, dipnets and hoop nets that do not substantively affect the habitat. There will be minimal disturbance to vegetation, and no harm to spawning or rearing habitat, or to water quantity and water quality. Thus there will be minimal effects on the critical habitat of this species from the actions discussed in this opinion, certainly not enough to contribute to a decline in the values of the habitat.

4.2 Factors to Be Considered

Fisheries may affect salmonid ESUs in several ways which have bearing on the likelihood of continued survival of the species. Immediate mortality effects accrue from the hooking or netting and subsequent retention of individual fish — those effects are considered explicitly in this opinion.

In addition, mortalities may occur to any fish which is caught and released. This is important to consider in the development of fishery management actions, as catch-and-release mortalities primarily result from implementation of management regulations designed to reduce mortalities to listed fish through live release. The catch-and-release mortality rate varies for different gear types, different species, and different fishing conditions, and those values are often not well known. Catch-and-release mortality rates have been estimated from available data and applied by TAC in the calculation of impacts to fish listed and proposed for listing evaluated in this consultation. The TAC applies a 10% incidental mortality rate to salmon caught and released during recreational fishing activities. The TAC also applies a 1% incidental mortality rate to salmon caught and released using dipnets

One of the primary considerations in evaluating these fisheries is the demographic effects on the survival and recovery of listed species. An important concern for many of the ESUs is the small size of the populations making up the ESU. Even when population trends are stable, a small population may be at significant risk of extinction due to environmental, demographic, or genetic stochasticity. The analysis of the proposed fisheries must be made in the context of whether the removal of fish from the upstream migrating salmonids will measurably reduce the sizes of extant populations and increase the risk of extinction of the ESU due to small constituent population sizes. This is especially important in evaluating the current proposal, since many of these fisheries take place in known-stock terminal or near-terminal areas, and each harvest impact can often be directly and specifically tied to a particular spawning population. NMFS has not yet defined the population structure of the Snake River spring/summer ESU consistent with the formal definitions in the Viable Salmonid Populations paper (McElhany et al. 2000). However, NMFS previously used the 39 subpopulations identified in Lichatowich et al. (1993), and more recently identified 15 spawning aggregations for use on an interim basis (Lohn 2002). Until there is new information that better defines the population structure of the ESU, NMFS believes that it is important to continue to maintain, wherever possible, the stock structure that represents the inherent diversity of the ESU.

4.3 Effects of the Proposed Action

The evaluation of effects of the proposed fisheries to spring/summer chinook is given by subbasin, including the mainstem Snake River and Tucannon, Clearwater, Salmon, and Grande Ronde rivers. Fisheries on the Salmon River are further divided to include those on the Rapid and Little Salmon rivers, and the South Fork Salmon River. No steelhead, sockeye or fall chinook salmon are expected to be taken in the proposed fisheries, due to migration timing and fishery location. The analysis of effects therefore focuses on the expected take of Snake River

spring/summer chinook.

Table 8 summarizes the projected harvest of spring/summer chinook salmon in the proposed fisheries for the Indian and non-Indian fisheries by subbasin. The Clearwater River and Lookingglass Creek fisheries do not impact listed fish. The mainstem Snake River and Rapid River fisheries are managed under a cap for incidental mortalities of listed fish. The SFSR fishery is managed under two harvest rate schedules that limit catch of fish returning to the Poverty Flats area and the South Fork Hatchery weir as discussed in more detail in section 6.1.2.2. In 2002 the SBT proposes a non-selective fishery. The SBT in practice may only be able to harvest 927 unlisted fish before reaching the proposed incidental take limit of 152 listed fish because the proportion of the listed run in the SFSR is 16.4%. Therefore their harvest of unlisted fish will likely be less than proposed.

5.0 CUMULATIVE EFFECTS

Cumulative effects are those effects of future Tribal, state, local or private activities, not involving Federal activities, that are reasonably certain to occur within the action area. For the purpose of this analysis, the action area is that part of the Snake River basin described in section 1.2 above. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities will be reviewed through separate section 7 consultation processes. Non-Federal actions that require authorization under section 10 of the ESA, and that are not included within the scope of this consultation, will be evaluated in separate section 7 consultations.

Future Tribal, state and local government actions will likely to be in the form of legislation, administrative rules, or policy initiatives, and land use and other types of permits. Government and private actions may include changes in land and water uses, including ownership and intensity, any of which could impact listed species or their habitat. Government actions are subject to political, legislative and fiscal uncertainties. These realities, added to geographic scope of the action area which encompasses numerous government entities exercising various authorities and the many private landholdings, make any analysis of cumulative effects difficult and frankly speculative. For a more detailed discussion of representative actions that are reasonably certain to occur see NMFS most recent consultation in the Snake river basin fisheries (NMFS 2001a).

Table 8. Projected harvest and incidental mortality for spring/summer chinook in 2002 resulting from the proposed Indian and Non-Indian fisheries by specified area/stock.

Subbasin	SBT		NPT		CTUIR		Non-Indian Sport	
	Non-Listed	Listed	Non-Listed	Listed	Non-Listed	Listed	Non-Listed	Listed
Mainstem Snake River	20	1	321	89				
Clearwater River	335	0	4,364	0				
Salmon River								
Rapid River Hatchery	243	10	3,665	20				
South Fork Salmon	2,657 (927*)	152	3,386	82			4,017	116
Grande Ronde River								
Lookingglass Creek			80	0	20	0	80	0
	3,255	163	12,316	198	20	0	80	0

* adjusted proposed harvest using 16.4% wild proportion in a non-selective fishery

5.1 State Actions

5.1.1 General

Each state in the Columbia River basin administers the allocation of water resources within its borders. Water resource development has slowed in recent years. Most arable lands have already been developed, the increasingly diversified regional economy has decreased demand, and there are increased environmental protections. If, however, substantial new water developments occur, cumulative adverse effects to listed fish are likely. NMFS cooperates with the state water resource management agencies in assessing water resource needs in the Columbia River basin. Through restrictions in new water developments, vigorous water markets may develop to allow existing developed supplies to be applied to the highest and best use. Interested parties have applied substantial pressure, including ongoing litigation, on the state water resource management agencies to reduce or eliminate restrictions on water development. It is, therefore, impossible to predict the outcomes of these efforts with any reasonable certainty.

In the past, each state's economy depended on natural resources, with intense resource extraction. Changes in the states' economies have occurred in the last decade and are likely to continue, with less large-scale resource extraction, more targeted extraction, and significant growth in other economic sectors. Growth in new businesses, primarily in the technology sector, is creating urbanization pressures and increased demands for buildable land, electricity, water

supplies, waste-disposal sites, and other infrastructure.

Economic diversification has contributed to population growth and movement in all three states, a trend likely to continue for the next few decades. Such population trends will result in greater overall and localized demands for electricity, water, and buildable land in the action area; will affect water quality directly and indirectly; and will increase the need for transportation, communication, and other infrastructure. The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect will be negative, unless carefully planned for and mitigated. Some of the state programs described below are designed to address these impacts. Oregon also has a statewide, land-use-planning program that sets goals for growth management and natural resource protection. Washington State enacted a Growth Management Act to help communities plan for growth and address the effects of growth on the natural environment. If the programs continue, they may help lessen the potential for the adverse effects discussed above.

5.1.2 State Mitigation Programs

5.1.2.1 Oregon

Most future actions by the state of Oregon are described in the Oregon Plan for Salmon and Watershed measures, which includes the following programs designed to benefit salmon and watershed health:

- Oregon Department of Agriculture water quality management plans
- Oregon Department of Environmental Quality development of total maximum daily loads (TMDLs) in targeted basins; implementation of water quality standards
- Oregon Watershed Enhancement Board funding programs for watershed enhancement programs, and land and water acquisitions
- ODFW and Oregon Water Resources Department (OWRD) programs to enhance flow restoration
- OWRD programs to diminish over-appropriation of water sources
- ODFW and Oregon Department of Transportation programs to improve fish passage; culvert improvements/replacements
- Oregon Department of Forestry state forest habitat improvement policies and the Board of Forestry pending rules addressing forestry effects on water quality and riparian areas
- Oregon Division of State Lands and Oregon Parks Department programs to improve habitat health on state-owned lands
- Department of Geology and Mineral Industries program to reduce sediment runoff from mine sites
- State agencies funding local and private habitat initiatives; technical assistance for establishing riparian corridors; and TMDLs

If the foregoing programs are implemented, they may improve habitat features considered important for the listed species. The success and effects of such programs will depend on the

continued interest and cooperation of the parties.

5.1.2.2 Washington

The state of Washington has various strategies and programs designed to improve the habitat of listed species and assist in recovery planning. Washington's 1998 Salmon Recovery Planning Act provided the framework for developing watershed restoration projects and established a funding mechanism for local habitat restoration projects. It also created the Governor's Salmon Recovery Office to coordinate and assist in the development of salmon recovery plans. Washington's "Statewide Strategy to Recover Salmon," for example, is designed to improve watersheds.

The Watershed Planning Act, also passed in 1998, encourages voluntary planning by local governments, citizens, and Tribes for water supply and use, water quality, and habitat at the Water Resource Inventory Area or multi-Water Resource Inventory Area level. Grants are made available to conduct assessments of water resources and to develop goals and objectives for future water resources management. The Salmon Recovery Funding Act established a board to localize salmon funding. The board will deliver funds for salmon recovery projects and activities based on a science-driven, competitive process. These efforts, if developed into actual programs, should help improve habitat for listed species.

Washington's Department of Fish and Wildlife and tribal comanagers have been implementing the Wild Stock Recovery Initiative since 1992. The comanagers are completing comprehensive species management plans that examine limiting factors and identify needed habitat activities. The plans also concentrate on actions in the harvest and hatchery areas, including comprehensive hatchery planning. The department and some western Washington treaty Tribes have also adopted a wild salmonid policy to provide general policy guidance to managers on fish harvest, hatchery operations, and habitat protection and restoration measures to better protect wild salmon runs.

Washington State's Forest and Fish Plan may be promulgated as administrative rules. The rules are designed to establish criteria for non-Federal and private forest activities that will improve environmental conditions for listed species.

Water quality improvements will be proposed through development of TMDLs. The state of Washington is under a court order to develop TMDL management plans on each of its 303(d) water-quality-listed streams. It has developed a schedule that is updated yearly; the schedule outlines the priority and timing of TMDL plan development.

Washington State closed the mainstem CR to new water rights appropriations in 1995. All applications for new water withdrawals are being denied based on the need to address ESA issues. The state established and funds a program to lease or buy water rights for instream flow purposes. This program was started in 2000 and is in the preliminary stages of public information and identification of potential acquisitions. These water programs, if carried out

over the long term, should improve water quantity and quality in the state.

As with Oregon's state initiatives, Washington's programs are likely to benefit listed species if they are implemented and sustained.

5.1.2.3 Idaho

The Idaho Department of Environmental Quality will establish TMDLs in the SRB, a program regarded as having positive water quality effects. The TMDLs are required by court order, so it is reasonably certain that they will be set. However, the same agency is considering relaxing other water quality standards in Idaho streams, which could have negative effects on water quality.

The state of Idaho has created an Office of Species Conservation to work on subbasin planning and to coordinate the efforts of all state offices addressing natural resource issues. The state actions targeted by this office include the following:

1. Continue diversion screening, in cooperation with BPA and BOR
2. Improve flow augmentation for fish passage through state programs
3. Implement the Forest Practices Act to maintain forest tree species, soil, air, and water resources and provide a habitat for wildlife and aquatic life.
4. Complete cumulative watershed effects assessments on more than 100 watersheds to support watershed planning.
5. Require 30-foot buffers along Class II streams.

These state-directed actions, if continued, will have positive effects for listed species and their habitat.

Demands for Idaho's groundwater resources have caused groundwater levels to drop and reduced flow in springs for which there are senior water rights. The Idaho Department of Water Resources has begun studies and promulgated rules that address water right conflicts and demands on a limited resource. The studies have identified aquifer recharge as a mitigation measure with the potential to affect the quantity of water in certain streams, particularly those essential to listed species.

5.2 Local Actions

Local governments will be faced with similar but more direct pressures from population growth and movement. There will be demands for intensified development in rural areas as well as increased demands for water, municipal infrastructure and other resources. The reaction of local governments to such pressures is difficult to assess at this time without certainty in policy and funding. In the past local governments in the action area generally accommodated additional growth in ways that adversely affected listed fish habitat. Also there is little consistency among local governments in dealing with land use and environmental issues so that any positive effects

from local government actions on listed species and their habitat are likely to be scattered throughout the action area.

In Washington, local governments are considering ordinances to address aquatic and fish habitat health impacts from different land uses. These programs are part of state planning structures. Some local government programs, if submitted, may qualify for a limit under the NMFS' ESA section 4(d) rule which is designed to conserve listed species. Local governments also may participate in regional watershed health programs, although political will and funding will determine participation and therefore the effect of such actions on listed species. Overall, without comprehensive and cohesive beneficial programs and the sustained application of such programs, it is likely that local actions will not have measurable positive effects on listed species and their habitat, but may even contribute to further degradation.

5.3 Tribal Actions

Tribal governments will continue to participate in cooperative efforts involving watershed and basin planning designed to improve fish habitat. The results from changes in Tribal forest and agriculture practices, in water resource allocations, and in changes to land uses are difficult to assess for the same reasons discussed under State and Local Actions. The earlier discussions related to growth impacts apply also to Tribal government actions. Tribal governments will need to apply comprehensive and beneficial natural resource programs to areas under their jurisdiction to produce measurable positive effects for listed species and their habitat.

5.4 Private Actions

The effects of private actions are the most uncertain. Private landowners may convert current use of their lands, or they may intensify or diminish current uses. Individual landowners may voluntarily initiate actions to improve environmental conditions, or they may abandon or resist any improvement efforts. Their actions may be compelled by new laws, or may result from growth and economic pressures. Changes in ownership patterns will have unknown impacts. Whether any of these private actions will occur is highly unpredictable, and the effects even more so.

6.0 INTEGRATION AND SYNTHESIS OF EFFECTS

Snake River sockeye and fall chinook salmon and steelhead are not likely to be adversely affected by the proposed fisheries. Following is a section describing the integration and synthesis of effects for Snake River spring/summer chinook.

6.1 Spring/summer chinook

The biological opinion and jeopardy determination relates to the Snake River spring/summer chinook ESU as a whole. This ESU includes all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, and Salmon rivers. The SR spring/summer chinook ESU consists of 39

local spawning populations (subpopulations) spread over a large geographic area (Lichatowich et al. 1993). It is also appropriate to consider the 15 spawning aggregations recently identified by Lohn (2002). The number of fish returning to Lower Granite Dam is, therefore, divided among these subpopulations and spawning aggregations. The relationships between these subpopulations, and particularly the degree to which individuals may intermix, are unknown. Some or all of the fish returning to several of the hatchery programs are also listed including those returning to the Tucannon River, Imnaha, and Grande Ronde hatcheries, and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River.

The proposed Snake River basin fisheries considered in this biological opinion will have little or no effect on most stocks within the basin. Only the fisheries in the mainstem Snake River are “mixed-stock” fisheries in the sense that these could impact the suite of stocks moving through the migration corridor. Spring/summer chinook returning to the Clearwater River are not listed. Proposed fisheries in the Clearwater River will therefore have no effect on listed fish. All other proposed fisheries are in terminal areas and will thus affect only the stocks returning to those areas. These fisheries are designed to target unlisted hatchery-origin fish while minimizing impacts to listed fish. The expected aggregate return is substantially higher than in recent years. There aren’t any good predictions about how these fish will distribute themselves among stocks, but presumably returns in most areas will be higher than in recent years. Because of the confined and restricted nature of the fisheries, the expected impacts on the ESU as a whole are quite low. Most of the proposed incidental take resulting from the proposed terminal-area fisheries occur in specific sections of the SFSR, Rapid and Little Salmon rivers. The mainstem Snake, and the SFSR and Rapid River fisheries are discussed below in more detail.

6.1.1 Mainstem Snake River

The mainstem fisheries proposed by the NPT and SBT occur in two distinct areas of the Snake River. These fisheries target primarily unlisted hatchery-origin spring chinook returning to the Oxbow Hatchery from the confluence of the Imnaha River upstream to Hells Canyon Dam. However, the tribes also propose to fish in the mainstem Snake River from the mouth of the Clearwater River to its confluence with the Columbia River. In these second area of the mainstem Snake River, the tribes also propose to target hatchery-origin spring/summer chinook destined to hatchery facilities in the Grande Ronde, Clearwater, and Salmon rivers and Oxbow Hatchery fish. The NPT propose a selective fishery, with the release of unmarked fish. The associated catch-and-release mortality is assumed to be 10% (Lefleur 2002a). The proposed SBT fishery is non-selective.

It is likely that most of the fishing effort by tribal members will occur in the area of the mainstem Snake River between the mouth of the Imnaha and Hells Canyon Dam. However, some level of fishing effort is also expected in the mainstem Snake River downstream from the mouth of the Clearwater River (Lefleur 2002a; Calica 2002b).

The NPT proposes a ceremonial harvest up to 399 hatchery-origin spring/summer chinook, in two delineated areas of the mainstem Snake River. The first area is from the confluence of the

Imnaha River, upstream to Hells Canyon Dam. The second area is from the mouth of the Clearwater River, down to the forebay of the Little Goose Dam. The Shoshone-Bannock Tribes propose to harvest spring/summer chinook salmon in unoccupied land areas of the mainstem Snake River and its tributaries between the mouth of the Imnaha River and Hells Canyon Dam; and downstream from the confluence of the Clearwater River to the mouth of the Snake River.

The predicted return of spring/summer chinook past the area of the mainstem Snake River between the mouth of the Imnaha and Hells Canyon Dam this year is 797 unlisted Oxbow hatchery-origin returns and 8 listed natural-origin returns (1% of the run). The predicted return of spring/summer chinook past the area of the mainstem Snake River, from the confluence of the Clearwater to the mouth of the Snake River is 53,370 adults. Of these, 36,522 (68%) are expected to be hatchery-origin returns, 16,818 (32%) natural-origin returns. Also 7,147 (13%) are expected to be listed hatchery-origin returns, and 14,153 (27%) are expected to be listed natural-origin returns. The proportion listed in this area is 40% of the run.

The SBT proposes a ceremonial harvest up to 20 hatchery-origin spring/summer chinook, in two delineated areas of the mainstem Snake River, with an incidental mortality of one listed fish. The only way for the SBT to harvest the proposed 20 fish to fish where there is less probability of encountering listed fish, or in the terminal area of the mainstem Snake River above the mouth of the Imnaha River. With a proportion of 1% listed fish in this area, the harvest of 20 unlisted fish would result in the mortality of less than one listed fish. However, with a run composed of 40% listed fish in the area from the confluence of the Clearwater River to the mouth of the Snake River, almost every other fish harvested would be listed. The SBT would reach their proposed incidental take limit of one listed fish in this particular area very quickly. A listed fish (hatchery-origin or natural-origin) harvested between the mouth of the Clearwater to the mouth of the Snake River, would be destined to either the Tucannon, Grande Ronde, Imnaha and Salmon rivers or the Oxbow Hatchery rack area.

The predicted incidental impact resulting from the mainstem Snake River selective fishery proposed by the NPT depends greatly on where the fishery effort occurs. If the NPT harvest occurs exclusively in the area of the mainstem Snake River between the confluence of the Imnaha River and Hells Canyon Dam, the proposed harvest of 399 hatchery-origin fish (50% of the run) would result in the handling of four listed natural-origin fish (50% of the run) with an associated mortality of less than one listed natural-origin spring/summer chinook (10% catch and release mortality). If the NPT fishery occurs exclusively from the mouth of the Clearwater River down to the forebay of the Little Goose Dam, the proposed harvest of 399 hatchery-origin fish would result in the mortality of 78 listed hatchery-origin fish, the handling of 107 listed natural-origin fish with a resulting mortality of 11 listed spring/summer chinook (Table 11).

In summary, given the expected returns for 2002, the range of mortalities associates with the fishery proposals in the mainstem Snake River considered in this opinion is between 2 listed spring/summer chinook (if the NPT fishery occurs exclusively between the confluence of the Imnaha River and Hells Canyon Dam), and 12 listed natural-origin (out of 7,147 fish), and 78 listed hatchery-origin fish (out of 14,153 fish), if the NPT fishery occurs from the mouth of the

Clearwater River down to the forebay of the Little Goose Dam. The NPT fishery impacts to listed fish from the mouth of the Clearwater River down to the forebay of the Little Goose Dam are distributed among fish returning to the Grande Ronde, Imnaha and Salmon rivers or the Oxbow Hatchery rack area. Although the proposals potentially could result in the harvest of 78 listed hatchery destined for the different terminal areas hatchery programs in the Snake River basin, the expected escapement to terminal areas is still higher than in recent years (LeFleur 2002a).

6.1.2 Salmon River

Proposed fisheries on the Salmon River include those on the Rapid and Little Salmon rivers, South Fork Salmon River.

6.1.2.1 Rapid and Little Salmon Rivers

The proposed Rapid River fishery is a terminal area fishery that targets hatchery-origin spring chinook in the Little Salmon River and Rapid River, its primary tributary. The projected return for unlisted Rapid River hatchery-origin spring chinook this year is 9,710 fish, which is 7,310 fish more than the escapement goal of 2,400. Some natural production occurs in the system in accessible parts of the Little Salmon River and above the Rapid River Hatchery weir. The projected return for listed Rapid River natural-origin spring chinook this year is 723 fish. This compares to an interim abundance target of 1,800 fish (Lohn 2002). An unknown portion of the natural production comes from spawning of hatchery-origin strays. The natural-origin fish are nonetheless listed, and management actions are specifically designed to minimize their harvest.

Fisheries in Rapid River are designed to harvest the surplus hatchery-origin fish while minimizing impacts on listed natural-origin fish. For example, the NPT and the SBT propose to harvest 3,655 and 243 hatchery fish with incidental lethal take of 20 and 10 listed natural-origin fish, respectively. The NPT fishery will be limited to dipnet gear only and require the release of unmarked fish once 16 listed fish are accounted for in the retention fishery and will close the fishery once four more mortalities are accrued during the dipnet portion of the fishery. Additional impacts to listed spring/summer chinook in IDFG fisheries would be limited to 26 fish. The proposed fisheries by the NPT, and those of the SBT and Idaho, will result in a terminal area harvest rate of about 8% while allowing for the harvest of several thousand hatchery-origin fish that are surplus to escapement needs. The expected escapement of natural-origin fish will still be on the order of 650 - 700 fish.

For this review, we considered: 1) the proposed fisheries relative to current management objectives for the Little Salmon River system, 2) the structure of the Evolutionarily Significant Unit (ESU) and its relation to the effected population, and 3) how the action may affect future decisions relative to long-term recovery.

The Rapid River Hatchery and Little Salmon River system has been managed since the mid-60's for hatchery production as mitigation for lost production from hydro development. Although the

natural production capacity of the system is relatively limited, the area above the hatchery weir on Rapid River and other areas in the Little Salmon River are also managed to promote natural production. Since the programs inception, there has been a small group of relatively bright, later-timed fish that returned each year. These were presumed to be the progeny of natural production in the system, although there is recent evidence that the hatchery and natural-origin fish are not genetically distinct. The fisheries and hatchery program were managed to minimize impacts on this later-timed component and promote the escapement of natural-origin fish. The proposed tribal and state fisheries meet the management objectives for the basin by providing substantial harvest opportunity with relatively limited impacts to natural-origin fish returning to the Little Salmon River (8% harvest rate), and few if any impacts to populations outside the basin.

The Snake River spring/summer chinook ESU has been subdivided into 15 geographic spawning aggregations (Lohn 2002) some of which may be further divided once the population structure of the ESU is finalized through the recovery planning process. The Little Salmon River Basin is one of the spawning aggregations and the only one currently managed as a hatchery mitigation program. The current management program does pose additional risks to the stock. Higher harvest rates result, and the hatchery program itself poses additional risk to the stock from hatchery influences. However, the effect of the proposed fisheries in the Little Salmon River on the ESU are limited to the fish returning to the terminal area. All of the other spawning aggregations are being managed with the primary objective of wild stock recovery.

Future management of the Rapid River Hatchery and the Little Salmon River system will depend on decisions made during recovery planning. However, until final decisions are made about the role of the Little Salmon River in recovery, the tribes and states propose to continue to manage the system to meet the current objectives. Continuing this strategy in 2002 poses no additional risk to other populations in the ESU, and does not limit existing recovery options that may ultimately be considered necessary for the population in the Little Salmon drainage.

6.1.2.2 South Fork Salmon River

The SFSR fishery will target unlisted, surplus hatchery-origin fish returning to the South Fork hatchery weir. The expected return of unlisted hatchery-origin fish to the area that are available for harvest is 6,772 fish based on the preseason forecast of 7,772 and the “reserve” group hatchery escapement objective of approximately 1000 fish. Areas open to fishing would include the South Fork Salmon River weir (RM 72) downstream to the confluence with the East Fork South Fork (RM 42).

NMFS has identified and managed for five breeding units or subpopulations in the South Fork (BRWG 1994; Bevan et al. 1994; NMFS 1995b; NMFS 2000a; NMFS 2001a) including:

- lower mainstem; SF mouth to Blackmare Ck. (including Poverty Flats)
- upper mainstem; SF Blackmare Ck. to Stolle Meadows
- Secesh River
- East Fork South Fork
- Johnson Ck.

The Secesh, East Fork South Fork, and Johnson Creek are tributaries off the lower mainstem South Fork. These are natural production areas. Johnson Creek is also supplemented using Johnson Creek origin broodstock. The proposed tribal fisheries will occur above the confluence with these tributaries; fish returning to these tributary are therefore unlikely to be affected by the proposed fisheries.

It is unclear whether these would all be distinguished as “populations” as defined in NMFS’ recent Viable Salmonid Population paper (McElhany et al. 2000). However, review of the available genetic data indicates that genetic differences between major tributaries such as the Secesh, Johnson Creek, and mainstem are as large or larger than those between different tributaries in other major Snake Basins (e.g., Upper Salmon, Grande Ronde, Imnaha). Historically, it is probable that fish returning to the Poverty Flats area on the lower mainstem and the Stolle Meadows area on the upper mainstem were distinct as there is geographic separation between them that is magnified by elevation differences. There are also run timing differences between these stocks. Earlier spawn timing at Stolle Meadows is evident.

The Poverty Flat and Stolle Meadows stocks do not now show consistent genetic differences. It is clear that they have been affected by past events and practices, particularly the early brood stock and hatchery management practices at the South Fork Hatchery. These past practices have likely reduced differences between the populations within the mainstem South Fork, but have not resulted in their complete homogenization (pers. com, R. Waples, NMFS June 2, 2000, P Dygert, NMFS). NMFS believes that it is important to continue to maintain as much of the inter-stock diversity as possible as part of an overall recovery strategy. NMFS therefore concludes that the fisheries should be managed in a way that accounts for the relative status of the Poverty Flats and Stolle Meadows stocks. NMFS has develop during recent consultations (NMFS 2000a and 2001a), separate harvest rate schedules for the Poverty Flats and Stolle Meadows summer chinook stocks of the SFSR.

The lower mainstem South Fork includes, at its upper end, the Poverty Flats index area. The projected return to the Poverty Flats area is low, on the order of 586, compared to suggested lower threshold and recovery levels of 300 and 850, respectively (NMFS 2000a) (Table 5). The expected return to Poverty Flats of 586 spawners in 2002 is greater than the last 5-year average returns (208) and is 61% and 48% higher than the contributing brood years (1997 and 1998) (Table 5). Nonetheless, conservative management is warranted until such time that actions can be taken to improve the long-term prospects of survival and recovery.

The upper mainstem South Fork, particularly the Stolle Meadows area which is above the hatchery weir, is in better shape. The area above the weir is managed for natural production, but

is supplemented with a uniquely identified group of listed hatchery-origin fish each of which had at least one natural-origin parent. (The group of fish being targeted in the fishery are unlisted hatchery-origin fish that are the product of hatchery-origin parents.) The existing supplementation protocol requires that a limited number of natural-origin and listed hatchery-origin fish (32 adults from each group) be taken back to the hatchery to maintain the on-station supplementation brood stock program. The remaining fish are passed above the weir to spawn naturally subject to the condition that no more than half of the fish going above the weir will be from the listed supplementation group. No “reserve” group fish (hatchery x hatchery crosses), which are the target of the proposed fisheries, are allowed to pass above the weir.

In order to provide stock specific harvest rate limits, NMFS developed during recent consultations (NMFS 2000a and 2001a), separate harvest rate schedules for the Poverty Flats and Stolle Meadows stocks of the SFSR. These provide guidance for evaluating proposed fisheries. The first harvest rate schedule (Table 9) depends on the expected return of natural-origin spawners to the Poverty Flats index area; the second (Table 10) depends on the forecast return to the weir of natural-origin and hatchery-origin supplementation fish and the resulting expected number that would be passed above the weir as a result of the hatchery/genetic management protocol. Tables 9 and 10 are tied to the suggested recovery and threshold abundance levels. These threshold abundance levels should ultimately be reviewed and revised if necessary, but for now provide reasonable benchmarks of known origin that can be used to scale the fisheries. These schedules provide a framework for evaluating proposed fisheries.

The effect of using these harvest rate schedules is that fishing opportunity in the lower mainstem area is relatively limited. Given the anticipated return of 586 fish, the allowable harvest of natural-origin fish destined for the Poverty Flats index area is 35 fish ($0.06 \times 586 = 35$). However, since fish destined for the upper area migrate through Poverty Flats, the take limit of natural-origin fish on Poverty Flats would be 156 fish (i.e. $35/[586/(52 + 586 + 458 + 1,522)] = 156$). The lethal take of 156 listed fish from Poverty Flats would presumably include 35 fish that were destined for Poverty Flats and 121 that were passing through the area as they head for above Poverty Flats and the SFSR weir. This calculation is conservative in that it assumes that there are no timing differences between listed fish from the respective areas and that they are therefore equally likely to be caught in fisheries in the lower area. In fact, there is reason to believe that fish returning to the Poverty Flats area have somewhat later return timing and may be more likely to hold in areas below the Poverty Flats index area. The probability of taking a fish destined for Poverty Flats is likely therefore less than is reflected by the above assumption that catch is proportional to relative abundance. Nonetheless, that is the assumption used; once 156 listed fish are taken from the Poverty Flats area, it would be closed to further harvest.

Given the anticipated preseason returns of listed natural and listed hatchery-origin fish to the weir (837 and 685, respectively), the expected number of fish over the weir is 1,522 and the allowable harvest rate, derived from the above schedule, is 12% of 773 plus 35% of 749 ($1,522 - 773$) or 355 listed fish. Because there is an additional 458 listed natural-origin fish destined to the area between Poverty Flats bridge and the South Fork trap, the adjusted allowable catch is $355/[1,522/(458 + 1,522)] = 461$ fish. The proposed total take associated with the SFSR fisheries

is 350 listed fish, which is less than what the abundance based harvest rate schedule would authorize this year. Although the schedule allows for substantial harvest of listed fish, the expected escapement above the weir after fisheries impacts is still 1,098, which is nearly twice the recovery level benchmark of 690 fish.

Table 8. Adult Chinook above the South Fork Weir

1994	205
1995	85
1996	139
1997	535
1998	300
1999	235
2000	694
<i>2001</i>	<i>3,801</i>
<i>2002</i>	<i>1,522</i>

¹ *Preseason expectation*

Table 9. Harvest rate schedule for the Poverty Flats index area. Interim threshold levels are 300 and 850.

% of Goal	Expected Return of N-O* Fish to Spawning Area	Harvest Rate - % of N-O Fish	Harvest - # of N-O Fish
	<50		0
	51 - 150		2
	151 - 300	2%	2 - 6
< 50%	301 - 425	4%	12 - 17
51% - 75%	426 - 638	6%	26 - 38
76% - 108%	639 - 918	8%	51 - 73
> 108%	> 919	35% (of margin > 918)	> 73

* Natural-origin

Table 10. Harvest rate schedule for the upper mainstem South Fork (Stolle Meadows). Interim threshold levels are 300 and 690.

% of Goal	Expected Return Above Weir	Harvest Rate - % of Listed Fish
	<50	
	51 - 150	
< 50%	151 - 345	4%
51% - 75%	345 - 518	9%
76% - 112%	519 - 773	12%
> 112%	> 773	35% (of margin > 773)

NMFS is relying on preseason estimates of expected returns provided in the biological assessment by TAC (LeFleur 2002a) and IDFG (Moore 2002). It is important to note that the preseason return estimates will be updated inseason based on fish counts at the weir and other information. The resulting harvest rate and the associated numerical limit on take may change inseason as determined by the harvest rate schedule. However, the harvest rate schedule in Tables 9 and 10 will apply and define both, the overall take limits and how these may be distributed between the two fishery areas.

The Shoshone Bannock and Nez Perce tribes have both proposed to fish from the weir down through the Poverty Flats areas to the confluence with the East Fork South Fork. The SBT propose to harvest up to 152 total listed fish in the SFSR below the weir in 2002. The SBT also propose to limit the harvest of listed fish in the Poverty Flats area (including the harvest of 64 listed fish, which would include 18 listed fish destined to Poverty Flats). The NPT propose to harvest up to 82 listed fish in the SFSR below the weir in 2002, but do not define where the take will occur and do not provide measures to limit the take of listed fish in the Poverty Flats area. As a result, the combined effect of the proposed tribal fisheries could be the take of 146 ($64 + 82 = 146$) listed fish at the Poverty Flats area, which is less than the 156 listed fish harvest limit for the Poverty Flats area.

Idaho's proposed SFSR fishery will result in the lethal take of 126 listed fish. However, Idaho is not proposing to fish at the Poverty Flats area and their projected take includes only listed fish destined for Stolle Meadows.

The combined incidental harvest rate of the proposed state and tribal fisheries is 360 listed fish destined for the SFSR, between the confluence of the East Fork and the SFSR weir (152-SBT, 82-NPT, 126-ID). The state and tribal proposals are all defined in terms of harvest rate limits, so numerical impacts would change with changing run sizes. NMFS expects the fisheries to be managed within the overall take limit and believes that it can be done effectively by the managers through coordinated inseason monitoring and management actions. If the run size drops substantially, the incidental harvest rate limit could be lower. The cumulative proposed harvest rate, based on preseason forecasts, is about 6.2% for the Poverty Flats stock and 18.5% for the Stolle Meadows stocks, including IDFG fisheries, which are not being directly considered in this opinion. These harvest rates are equal or less than NMFS's evaluation criteria as defined in Tables 9 and 10.

The proposed SFSR fisheries in 2002 impact only two of the five summer chinook stocks in the Salmon River. Based on the expected return of listed natural-origin (837) and hatchery-origin (685) fish to the weir, the supplementation protocol, and the proposed incidental fisheries impacts, the expected number of fish that will be passed above the weir is 1,098, which is over twice the average of the contributing brood years (1997 and 1998). To provide further perspective during consultation, NMFS has proposed lower and recovery level bench marks of 300 and 690 for the Stolle Meadows area. The lower threshold is from the BRWG (1994) guidance, although NMFS is not aware of any prior determination regarding whether this was a "small" or "large" stock as discussed by the BRWG. (The recommended lower threshold for

small populations is 150.) The upper threshold was derived based on available estimates of the number of spawners necessary to achieve 70% of smolt production capacity. If we disregard the contribution of supplementation (685 fish), the expected return to the Stolle Meadows area is 837 fish. The preseason forecast for Poverty Flats is 586 adults (Moore 2002). After the incidental mortality of 36 fish, the expected return is 550 adults, which is almost twice the average of the contributing brood years (1997 and 1998).

7.0 CONCLUSION

Based on the above considerations, NMFS has determined that recreational fisheries proposed by the state of Oregon and tribal C&S fisheries proposed to take place in the Snake Basin in 2002 are not likely to adversely affect Snake River sockeye salmon, Snake River fall chinook salmon, or Snake River steelhead. Also, NMFS has determined that the proposed fisheries are not likely to jeopardize the continued existence of Snake River spring/summer chinook salmon.

The designated critical habitat features for spring/summer and fall chinook, sockeye salmon, and steelhead in the Snake River are not affected by the fisheries addressed here. The activities considered in this consultation will not result in the destruction or adverse modification of any of the essential features of the critical habitat.

8.0 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. Harass is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

The measures described below are non-discretionary; they must be undertaken by the action agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The action agencies have a continuing duty to regulate the activity covered in this incidental take statement. If the action agencies (1) fail to assume and implement the terms and conditions or (2) fail to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the agencies must

report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement [50 CFR §402.14(i)(3)].

8.1 Amount or Extent of Take Anticipated

No Snake River sockeye, fall chinook salmon or steelhead are expected to be taken as a result of the 2002 fisheries proposed for the Snake River basin.

The proposed 2002 fisheries in the Snake River basin will result in the incidental take of Snake River spring/summer chinook salmon. Anticipated take levels are shown by area and fishery in Table 11. No mortalities of listed Snake River spring/summer chinook salmon are expected in the non-Indian recreational fisheries proposed by Oregon and considered in this opinion. A total of 2,055 listed spring/summer chinook are expected to be taken in tribal fisheries, resulting in 354 mortalities. This includes both listed natural-origin and listed hatchery-origin fish that are destined to return to terminal areas in the Snake River basin.

Fisheries for spring/summer chinook in the mainstem Snake and Little Salmon/Rapid River areas shall be managed subject to provisions described in the biological assessment and take limits shown in Table 11. SBT and NPT tribal fisheries in the SFSR shall be managed subject to incidental mortality caps, harvest rates, gear, timing and location provisions described in the biological assessment and reiterated in this opinion.

In the mainstem Snake River, the NPT proposes to harvest 399. The incidental mortality associated with the fishery will depend on how fishing effort is distributed throughout the fishing areas. If all the effort is concentrated from the confluence of the Imnaha River upstream to Hells Canyon Dam, the resulting incidental mortality would be 1 listed fish. If all the effort is concentrated from the mouth of the Clearwater River down to the forebay of the Little Goose Dam, the proposed harvest of 399 hatchery-origin fish by the NPT would result in the harvest of 321 unlisted hatchery-origin spring/summer chinook, the take of 78 listed hatchery-origin spring/summer chinook. In the proposed fishing area, listed natural-origin fish comprise 27% of the run. Harvesting 399 hatchery fish would result in the handling of 107 listed natural-origin fish (total take of 185 fish) with a resulting mortality of 11 listed spring/summer chinook (Table 11).

The SBT propose to harvest spring/summer chinook salmon in the mainstem Snake River and its tributaries in the area between Hells Canyon Dam and the mouth of the Imnaha River; and below the mouth of the Clearwater to the mouth of the Snake River in 2002. Most of the effort is expected to occur between the Hells Canyon Dam and the mouth of the Imnaha River. The Tribes propose to harvest 20 spring/summer chinook of which one may be listed wild chinook as the 2002 harvest guideline for this area. Based on the fishery proposals, the actual incidental mortality most likely be less than the maximum of 90 fish. For the purpose of this opinion, the anticipated incidental mortality for the NPT and SBT in the mainstem Snake River are 89 and 1 listed fish, respectively.

For Rapid River, the NPT and SBT propose limits for incidental mortality of listed fish. The NPT proposes a limit of 20 listed fish and the SBT a limit of 10 listed fish. For the purpose of this opinion, the anticipated incidental mortality for the NPT and SBT are 20 and 10 listed fish, respectively.

For the SFSR, the incidental harvest rate limit is set by the abundance based harvest rate schedules in Tables 9 and 10. Fisheries in the SFSR are managed according to two separate harvest rate schedules for the Poverty Flats and Stolle Meadows stocks. Given preseason forecasts for Poverty Flats and Stolle Meadows, and the harvest rate schedules in Tables 9 and 10, the corresponding incidental mortality limits are 35 and 355 listed fish, respectively. Because a significant proportion of listed fish that may be killed while fishing in the Poverty Flats are destined for upstream areas, and given the proportions of fish destined for all areas in the SFSR, the total mortality limit for listed fish while fishing at the Poverty Flats index area is 156 fish. This would result in the incidental mortality of 35 listed fish destined for Poverty Flats. Similarly, given the proportions of fish destined for all areas in the SFSR, the total allowed kill of listed fish while fishing on the area upstream Poverty Flats and below the weir is 461 listed fish. This would result in the incidental mortality of 355 listed fish destined for Stolle Meadows. Expected returns to the Poverty Flats index area cannot be updated inseason, thus impact limit of 35 listed fish is set preseason. Expected returns to the Stolle Meadows index area can be refined as the season progresses, particularly as fish start arriving at SFSR weir. Therefore, the State of Idaho, the Nez Perce Tribe and the Shoshone-Bannock Tribes must continuously monitor returns to the weir by contacting facility managers and other fishery management personnel as needed. TAC shall update return projections inseason as information is available, and shall report this information to NMFS, the State of Idaho and the tribes as soon as the projections are updated. If the run size changes inseason, the level of anticipated take may change also, but will be limited by that which results from application of Tables 9 and 10 to the current run size information.

This consultation specifically considers proposed SBT and NPT tribal fisheries on the SFSR. However, the state of Idaho has also proposed fisheries in the SFSR which are authorized through section 10 permit 1233, subject to the requirement that the state fisheries be in compliance with total incidental take limits for the combined fisheries. This consultation therefore defines the take limit for the South Fork fishery that is applied to the tribal fisheries through this consultation and to the State of Idaho through permit 1233.

8.2 Effect of the Take

In this biological opinion, NMFS has determined that the level of anticipated take is not likely to jeopardize the continued existence of listed salmonid species or result in the destruction or adverse modification of designated critical habitat.

Table 11. Estimated take (and mortalities) of listed salmonids in 2002 Snake River basin treaty Indian and non-Indian fisheries, with reasonable and prudent measure implemented. (NPT: Nez Perce Tribe; SBT: Shoshone-Bannock Tribes; CTUIR: Confederated Tribes of the Umatilla Indian Reservation; ODFW: Oregon Department of Fish and Wildlife; IDFG: Idaho Department of Fish and Game).

Fishery	Total take (and mortality) of listed salmonids
	Spring/summer chinook salmon
Mainstem Snake River	
NPT Snake River Mainstem Spring/summer chinook	185(89)
SBT Snake River Mainstem Spring/summer chinook	1(1)
Clearwater River	
SBT Clearwater River Basin spring chinook	0(0)
NPT Clearwater River Basin spring chinook	0(0)
NPT Clear Creek spring chinook	0(0)
NPT Crooked River/Red River spring chinook	0(0)
NPT Lochsa spring chinook	0(0)
NPT Selway spring chinook	0(0)
Salmon River	
IDFG South Fork Salmon River spring/summer chinook ¹	1,158(116) ¹
NPT Little Salmon/Rapid River spring chinook	360(20)
SBT Little Salmon/Rapid River spring chinook	10(10)
NPT South Fork Salmon River spring/summer chinook	1347(82) ²
SBT South Fork Salmon River spring/summer chinook	152(152)
Grande Ronde River	
ODFW Lookingglass spring chinook	0(0)
NPT/CTUIR Lookingglass spring chinook	0(0)

¹ Impacts from IDFG fisheries are considered but not subject to consultation in this opinion.

² The NPT will switch to selective gear (dipnets) once the mortality take limit of 64 listed fish is reached. Additional mortality from subsequent fishing accounts for the take of 18 additional listed fish.

8.3 Reasonable and Prudent Measures

The NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of listed species:

1. The tribes and the states shall manage their fisheries to minimize harvest impacts to listed salmonids consistent with their proposals.
2. The tribes and the states shall conduct sufficient monitoring and enforcement activities to allow the accurate and timely enumeration of observed and estimated mortalities of listed hatchery-origin and natural-origin fish.

8.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the action agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

- 1a. The state of Oregon and the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation and the Shoshone-Bannock Tribes must manage their fisheries to limit their harvest of spring/summer chinook salmon to the levels described in the biological assessment, as modified by this biological opinion. Inseason management actions taken during the course of the fisheries must be consistent with the harvest objectives described and summarized in this opinion.
- 1b. The allowable catch in the proposed fisheries is dependent upon the expected return to the individual fishery locations. Initial projections of returns are made as described in the biological assessment. Expected returns can be refined as the season progresses, particularly as fish start arriving at hatchery weirs. The Nez Perce Tribe and the Shoshone-Bannock Tribes must therefore continuously monitor returns to each weir and other locations by contacting facility managers and other fishery management personnel as needed. TAC shall update return projections inseason as information is available, and shall report this information to NMFS, the State of Idaho and the tribes as soon as the projections are updated.
- 1c. The allowable impact to listed in the proposed SFSR fishery is dependent upon the actual return to the Poverty Flats and Stolle Meadows index areas. Initial projections of returns are made as described in the biological assessment. Expected returns to the Poverty Flats index area cannot be updated inseason, thus impact limits are set preseason. Expected returns to the Stolle Meadows index area can be refined as the season progresses, particularly as fish start arriving at SFSR weir. Therefore, the State of Idaho, the Nez Perce Tribe and the Shoshone-Bannock Tribes must therefore continuously monitor returns to the weir by contacting facility

managers and other fishery management personnel as needed. TAC shall update return projections inseason as information is available, and shall report this information to NMFS, the State of Idaho and the tribes as soon as the projections are updated. Inseason monitoring of catch must continue at levels sufficient to fully describe the composition of the catch, in terms of hatchery- vs. natural- origin, and listed vs. unlisted status, such that daily progress of the fishery toward guidelines and constraints can be determined and appropriate steps to modify or close fishery areas can be taken when necessary. This monitoring must take the form of fisheries personnel representing the appropriate fisheries co-manager(s) present at the time of any implemented fishery and conducting creel surveys, exit surveys, and personal observations of the course of the fishery, including enumerating number and types of fish caught by type of gear and by fishery area, numbers released by type of gear and fishery area, and other information on the fishery related to the successful moderation of impacts to listed species. Any other method of determining take (both retained and released catch), must also be conducted as needed to provide fuller information on fishery impacts.

- 1d. Sampling of the fisheries for stock composition, including the collection of coded-wire tags and biological information, must also continue at levels comparable to those in recent years, and must be increased where necessary to insure a thorough post-season analysis of fishery impacts on listed species.
- 1e. The TAC shall forward to NMFS a postseason report detailing and summarizing the actual catch in all fisheries considered in this biological opinion. An analysis of impacts of these fisheries, on a site-by-site basis, on listed natural-origin and hatchery-origin fish should be a part of this report. Information on stock composition in terminal return areas and in fisheries obtained through coded-wire tag recoveries, genetic stock sampling, or sampling for other biological information should also be included. This report shall be provided to Enrique Patiño, NMFS, Sustainable Fisheries Division, Seattle, Washington, by April 15, 2003.
- 2a. Inseason monitoring of catch and other management measures must continue at levels sufficient to fully describe the composition of the catch, in terms of species, hatchery- vs. natural- origin, and listed vs. unlisted status (primarily reliant upon existence and type of mark), such that daily progress of the fishery toward guidelines and constraints can be determined and appropriate steps to modify or close each given fishery can be taken when necessary. Timely inseason monitoring is critical. This monitoring must take the form of fisheries personnel representing the

appropriate fisheries co-manager(s) present at the time of any implemented fishery and conducting creel surveys, exit surveys, and personal observations of the course of the fishery, including enumerating number and types of fish caught, numbers released, and other information on the fishery related to the successful moderation of impacts to listed species. Any other method of determining take (both retained and released catch), such as telephone surveys, must also be conducted as needed to provide fuller information on fishery impacts.

- 2b. Catch reports from the inseason monitoring programs for each management entity shall be provided to NMFS weekly or more often if necessary to allow for implementation of management actions consistent with terms and conditions of this opinion.
- 2c. For areas in which listed spring/summer chinook salmon may occur, the Nez Perce Tribe and the Shoshone-Bannock Tribes shall curtail their chinook salmon fishery in that area when any of the guidelines for hatchery-origin and natural-origin adult harvest based on projected returns have been reached.
- 2d. Each entity opening a fishery shall take measures to reduce the deliberate illegal take of listed fish. These measures shall include extensive presence of law enforcement personnel representing the appropriate co-manager(s) at each potential fishing area, including areas which are not open to fishing but may experience illegal effort. Enforcement personnel and conservation officers of each entity shall report the incidental take of adult and juvenile listed salmon in the fisheries. Co-managers' personnel shall conduct creel surveys or other forms of angler contact to monitor the possible incidence of illegal harvest activity. Enforcement personnel and conservation officers of each entity shall coordinate with the other co-managers to best assure adequate coverage of fishery areas, and shall share, on a timely basis, information on potential enforcement issues obtained during enforcement, monitoring, redd counts, stream surveys, or other activities. The illegal take of listed fish should be described in the required report developed post-season by TAC, as described in Term and Condition 1a above.
- 2e. Each entity opening a fishery shall take measures to prevent the inadvertent illegal take of listed fish. Each co-manager shall take measures to inform fishers on subjects such as differentiating listed from non-listed fish, avoiding redds, and methods for releasing non-target fish. Actions should also be taken to identify and protect, through warning signs or other means, critical spawning areas of listed salmon.

The NMFS believes that incidental take resulting from the proposed fisheries will be no greater than described in section 8.1, above. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, the specified level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The agencies must immediately provide an explanation of the causes of the excess taking, and review with the NMFS the need for possible modification of the reasonable and prudent measures.

9.0 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed or critical habitat, to help implement recovery plans, or to develop information.

1. The tribes, states, and federal agencies should continue to develop production, supplementation, and harvest management guidelines for the Snake River basin that are consistent with long-term recovery objectives for listed species.
2. The estimated return of natural-origin Snake River spring chinook includes fish destined for the Clearwater River which are not part of the ESU. There are currently no estimates of the proportion of the total return originating in the Clearwater River. The current assessments therefore overestimate both the expected return and numerical impacts to listed fish. TAC should develop the information necessary to distinguish between listed spring chinook and those destined for the Clearwater River.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

10.0 REINITIATION

This concludes formal consultation on the actions outlined in the biological assessment. As provided in 50 CFR §402.16, reinitiating of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the federal agency must reinitiate

consultation immediately.

NMFS finds the terms and conditions contained in this opinion necessary for the conservation of the affected listed species. In arriving at these terms and conditions, NMFS has been mindful of affected treaty rights and its Federal trust obligations. NMFS will reconsider the terms and conditions in this opinion that affect treaty rights in the event new information indicates such reconsideration is warranted.

11.0 MAGNUSON-STEVENSON ACT ESSENTIAL FISH HABITAT CONSULTATION

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));
- NMFS must provide conservation recommendations for any Federal or State action that would adversely affect EFH (§305(b)(4)(A));
- Federal agencies must provide a detailed response in writing to NMFS within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NMFS is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would

adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

11.1 Identification of Essential Fish Habitat

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

11.2 Proposed Action and Action Area

For this EFH consultation, the proposed actions and action area are as described in detail above. The action is the issuance of an incidental take statement pursuant to section 7 of the ESA. The proposed action area includes the Snake River from its mouth upstream to the Hells Canyon Dam, including its tributaries. The action area includes habitats that have been designated as EFH for various life-history stages of chinook and coho salmon. A more detailed description and identification of EFH for salmon is found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of the impacts on these species' EFH from the above proposed action is based on this information.

11.3 Effects of the Proposed Action

Based on information submitted by TAC, as well as NMFS' analysis in the ESA consultation above (see particularly section 4.1), NMFS believes that the effects of this action on EFH are likely to be within the range of effects considered in the ESA portion of this consultation.

11.4 Conclusion

Using the best scientific information available and based on its ESA consultation above, as well as the foregoing EFH sections, NMFS has determined that the proposed actions are not likely to adversely affect Pacific salmon EFH.

11.5 EFH Conservation Recommendation

Pursuant to Section 305(b)(4)(A) of the MSA, NMFS is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. While

NMFS has determined that the proposed action is not likely to adversely affect EFH, the Reasonable and Prudent Measures and the Terms and Conditions outlined above are applicable to designated salmon EFH. Therefore, NMFS recommends that those same Reasonable and Prudent Measures, and the Terms and Conditions be adopted as the EFH Conservation Recommendation for this consultation.

11.6 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NMFS' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

11.7 Consultation Renewal

The action agencies must reinitiate EFH consultation if plans for these actions are substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for the EFH conservation recommendations (50 CFR Section 600.920(k)).

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APPENDIX 1

Projected preseason Lower Granite Dam counts and Snake River tributary returns of spring and summer chinook in 2002. Footnotes from TAC (LeFleur 2002a - Table 2)					
Tributary	Spring/Summer Chinook Returns				
	Hatchery	Wild/Natural	Listed	Total	
Snake River					
Oxbow Hatchery	797	8	8	805	1/
Tucannon River	304	297	601	601	2/
Clearwater River					
Clearwater Wild/Natural	0	2,542	0	2,542	3/
Red River Rack & Crooked River	2,767	81	0	2,848	4/
Powell Rack	2,512	42	0	2,554	5/
Dworshak Hatchery	1,820	0	0	1,820	6/
Kooskia Hatchery	3,615	0	0	3,615	7/
Salmon River					
Little Salmon Wild/Natural &	0	324	324	324	8/
Rapid River Hatchery	9,710	399	399	10,109	9/
Lower Main Salmon Wild/Natural	0	112	112	112	10/
Middle Main Salmon Wild/Natural	0	232	232	232	11/
South Fork Salmon Wild/Natural	0	1,030	1,030	1,030	12/
South Fork Salmon River Weir	8,457	837	1,522	9,294	13/
Middle Fork Salmon Wild/Natural	0	2,869	2,869	2,869	14/
Panther Creek Wild/Natural	0	0	0	0	15/
Lemhi River Wild/Natural	0	303	303	303	16/
Pahsimeroi Hatchery	382	78	460	460	17/
Sawtooth Hatchery	1,042	1,143	1,933	2,185	18/
East Fork Rack	2	0	2	2	19/
Upper Main Salmon Wild/Natural	0	1,242	1,242	1,242	20/
Headwaters Salmon Wild/Natural	0	306	306	306	21/
Grande Ronde River					
Grande Ronde Subbasin	1,353	2,309	3,662	3,662	22/
Lookingglass Hatchery	160	0	0	160	23/
Imnaha River					
Imnaha Subbasin	3,631	2,665	6,296	6,296	24/
TOTAL	36,552	16,818	21,300	53,370	

Footnotes for Appendix 1, from TAC tables.

- 1/ Lookingglass Hatchery fish will not be trapped at LWG in 2001.
- 2/ Oxbow Hatchery. Independent prediction by IDFG.

- 3/ Tucannon River. Independent prediction by WDFW.
- 4/ Clearwater Wild/Natural proportion spring/summer smolt production above Lower Granite Dam (.0864). Values from Subbasin Planning Smolt Density Model, StreamNet, 1/16/97.
- 5/ Red River Rack and Crooked River Rack. Independent prediction by IDFG.
- 6/ Powell Rack. Independent prediction by IDFG.
- 7/ Dworshak Hatchery. Independent prediction by USFWS.
- 8/ Kooskia Hatchery. Independent prediction by USFWS.
- 9/ Little Salmon Wild/Natural proportion spring/summer smolt production above Lower Granite Dam (.0110). Values from Subbasin Planning Smolt Density Model, StreamNet, 1/16/97.
- 10/ Rapid River Hatchery. Independent prediction by IDFG.
- 11/ Lower Main Salmon Wild/Natural proportion spring/summer smolt production above Lower Granite Dam (.0038). Values from Subbasin Planning Smolt Density Model, StreamNet, 1/16/97.
- 12/ Middle Main Salmon Wild/Natural proportion spring/summer smolt production above Lower Granite Dam (.0079). Values from Subbasin Planning Smolt Density Model, StreamNet, 1/16/97.
- 13/ South Fork Salmon Wild/Natural. Includes South Fork Salmon River and tributaries below South Fork Weir. Proportion spring/summer smolt production above Lower Granite Dam (.0350). Values from Subbasin Planning Smolt Density Model, StreamNet, 1/16/97.
- 14/ South Fork Salmon River Rack. Independent prediction by IDFG.
- 15/ Middle Fork Salmon Wild/Natural proportion spring/summer smolt production above Lower Granite Dam (.0975). Values from Subbasin Planning Smolt Density Model, StreamNet, 1/16/97.
- 16/ Panther Creek Wild/Natural. IDFG and SBT consider this run extirpated.
- 17/ Lemhi River Wild/Natural proportion spring/summer smolt production above Lower Granite Dam (.0103). Values from Subbasin Planning Smolt Density Model, StreamNet, 1/16/97.
- 18/ Pahsimeroi Hatchery. Independent prediction by IDFG.
- 19/ Sawtooth Hatchery. Independent prediction by IDFG.
- 20/ East Fork Rack. Independent prediction by IDFG.
- 21/ Upper Main Salmon Wild/Natural. Includes Salmon River and tributaries from the Middle Fork

Salmon River up to and including the Yankee Fork Salmon River. Proportion spring/summer smolt production above Lower Granite Dam (.0422). Values from Subbasin Planning Smolt Density Model, StreamNet, 1/16/97.

- 22/ Headwaters Salmon Wild/Natural. Includes Salmon River and tributaries from below Sawtooth Hatchery downstream to the Yankee Fork. Proportion spring/summer smolt production above Lower Granite Dam (.0104). Values from Subbasin Planning Smolt Density Model, StreamNet, 1/16/97.
- 23/ Grande Ronde Subbasin. Independent prediction by ODFW. Does not include Lookingglass Creek returns.
- 24/ Lookingglass Hatchery. Independent prediction by ODFW.
- 25/ Imnaha Subbasin. Independent prediction by ODFW.